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See p. 761 for this week's announcement.
Previous Announcement December 7.

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SEE ADVERTISEMENT LAST WEEK PAGE 646.

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See Advertisement on page III. of Wrapper.

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See displayed advertisement last week, p. IX.

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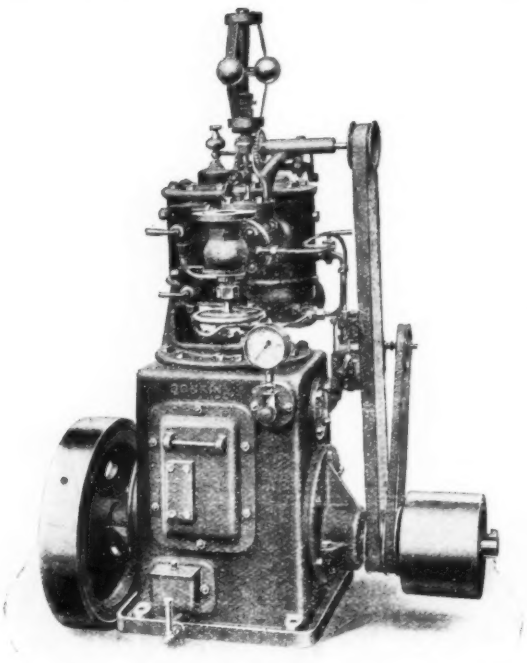

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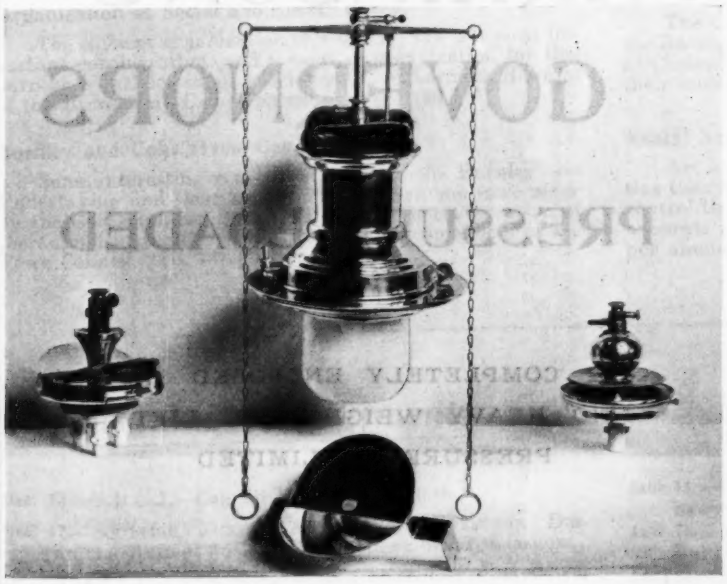

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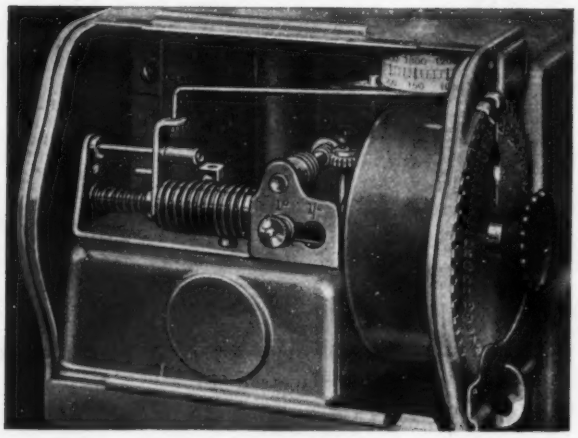

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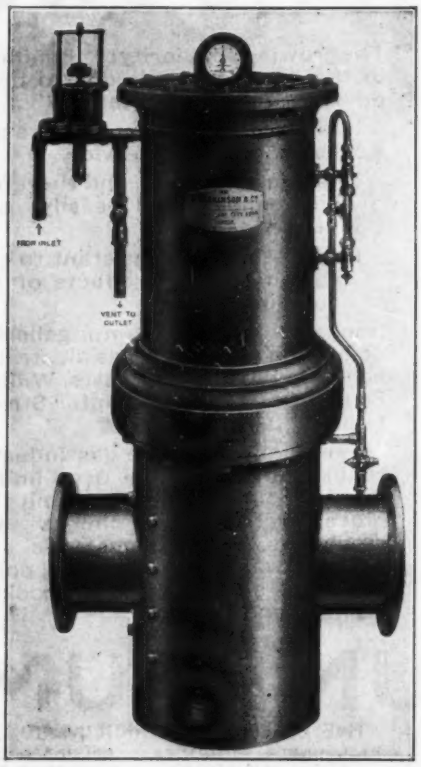

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THE GAS JOURNAL

DECEMBER 14, 1932

Vol. 200 84th Year No. 3630

A Glance at the Contents—

Preparation of Road Tar.

M. A. Eichelbrenner deals with the preparation of road tar at Montbéliard Gas-Works by the T.I.C. process. [p. 739.]

Visit to a Gas Appliance Factory.

The Willenhall Works of Messrs. John Harper & Co., Ltd., were inspected by the Midland Junior Gas Association on Dec. 1. [p. 736.]

Recent Developments in Gas Fitting Practice.

This was the subject of a paper read on Dec. 9 by Mr. R. N. LeFevre, of Watson House, before the London and Southern District Junior Gas Association. [p. 749.]

A Triumph of Marketing Methods.

Cargoes of Welsh coke have reached Turnu Severin, on the borders of Yugoslavia and Rumania. The total distance covered by sea and canal is nearly 4000 miles.

Organization of Social and Sports Clubs.

The efficient organization of a sports club is a most important consideration, and a basis of organization for this purpose is outlined in an article by Mr. J. Leeming Robson, of the Birkenhead Gas Department. [p. 788.]

Burnley and Coke Oven Gas.

Some interesting remarks relative to the Burnley Gas Undertaking and their supply of coke oven gas were made by the Gas Engineer, Mr. J. H. Clegg, on the occasion of the annual inspection of the gas-works by members of the Town Council. [p. 737.]

Low-Temperature Carbonisation, Ltd.

The Directors of this Company are taking steps for the establishment, if possible, of hydrogenation plant to treat 20,000 tons of "Coalite" oil produced annually from coal. [p. 737.]

South-Eastern Gas Corporation, Ltd.

This is the title of a new holding Company, with an initial capital of £323,000, which will take over the controlling interests in a number of gas undertakings in Kent. [p. 737.]

Institution of Gas Engineers.

Further written contributions and authors' replies to the discussions at the Autumn Research Meeting of the Institution of Gas Engineers held in London in November last will be found on p. 743 *et seq.*

An Ilford Rating Appeal.

The Gas Light and Coke Company lately appealed to the Rating Appeal Committee of the Essex Quarter Sessions, at Chelmsford, for a reduction of the assessment of part of their undertaking in the Borough of Ilford. [p. 741.]

Rental Superintendent Required.

Applications are invited by the South Metropolitan Gas Company for the position of Rental Superintendent to control the work of a department dealing with over 400,000 accounts monthly. The salary will be not less than £1000 per annum. [p. 760.]

Forthcoming Engagements

Dec. 15.—S.B.G.I.—Council Meeting, 2.30 p.m.

Dec. 17.—SCOTTISH JUNIOR ASSOCIATION (WESTERN DISTRICT).—Annual Social, Ca'doro Restaurant, Glasgow.

Dec. 21.—B.C.G.A.—Meeting of the Executive Committee, 12 noon, 28, Grosvenor Gardens, S.W. 1.

Dec. 21.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1.

Jan. 12.—MIDLAND JUNIOR ASSOCIATION.—Meeting in Birmingham. Paper by Mr. H. Smith.

Jan. 14.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Glasgow. Address by Mr. C. Valon Bennett.

Jan. 14.—WESTERN JUNIOR ASSOCIATION.—Meeting at Exeter. Paper by Mr. D. L. Copp.

Jan. 21.—YORKSHIRE JUNIOR ASSOCIATION.—Meeting at Halifax. Paper by Mr. J. Bradbury.

Jan. 27.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. P. Wedgwood.

1932 "JOURNAL" Directory.

Page 64. STALYBRIDGE. Mr. W. Hill, Engineer and Manager, retired.

EDITORIAL NOTES

Gas Fitting To-Day

No phase of the Gas Industry's activities has undergone greater change during the past few years than has the practice of gas fitting. This change was certainly needed; the only surprising thing about it is that it was so long delayed. The gas fitter to-day has every opportunity of being a really first-class craftsman who can take a pride in his work in the knowledge that he is of no mean importance in enhancing the goodwill and prestige of our Industry. "Recent Developments in Gas Fitting Practice" is the title of a most welcome and valuable contribution in this issue of the "JOURNAL," the author, Mr. R. N. LeFevre, being particularly capable, as a result of experience at Watson House, of interpreting the enlightened view of what constitutes a good gas fitter and what is meant by good gas fitting practice.

The properly trained gas fitter provides our Industry with an opportunity of demonstrating to the public, in an unobtrusive yet singularly effective manner, the remarkable recent developments which make gas essentially a modern fuel for every type of home, from the most elaborate to the humblest. This opportunity can be exploited to the full only by keeping in touch with these developments and by appreciating the major rôle which the fitter can play in their application. There never was a time when the Gas Industry had so much to offer the consumer. It can offer a uniform, plentiful, and reliable supply of refined energy manufactured most efficiently, and it has at its command a variety of apparatus to suit every pocket and every taste. It can be assumed that a satisfactory supply of gas is available at a consumer's premises, but gas service, from the point of view of the consumer, only begins there. The average householder is not in the least concerned with the niceties of oxide purification or naphthalene removal; he takes it for granted—or at least we hope he does—that the gas engineer knows his job. On the other hand, every householder is concerned about the appearance as well as the effectiveness of the gas appliances installed. And the very best of gas apparatus, fed by the very best of gas supplies, can be ruined in appearance by casual, careless, sloppy fitting work. As Mr. LeFevre says, "the consumer sees more of the gas fitter than any other representative of a gas undertaking. His work remains as a joy or an eyesore for all time—good gas fitting practice is one of the best advertisements we have."

In regard to these recent developments it may well be queried whether they are "sold" enthusiastically. Our belief is that more than half the public to-day are unaware of many of them. Take as an instance the plug-in connector. For years everyone in the Gas Industry has hoped for such a device—what an excellent competitive weapon it would be! We now have one; but what is happening? Is it really being sold as it could be, taking into consideration the innumerable "connection" appliances now available? In many districts the sales of such small-consumption fittings are to be counted in hundreds when they should be counted in thousands. And it all boils down to fitting work. There can obviously be no success of the "plug in to comfort" movement if the plugs are not available. We use this example solely to stress our contention that the Gas Industry's fitting work must be modern if full advantage is to accrue from modern advertising and modern salesmanship.

The contribution by Mr. LeFevre is a guide to modern gas fitting and an encouragement for the future, for there never was more research activity on the utilization, as distinct from the manufacturing, side of our Industry. Of especial interest are the author's descriptions of a new rigid meter connection, a new meter testing device, and a new safety cut-off. No one will quarrel with his remark that the gas meter cannot be regarded as an object of beauty; it is for this reason that it is desirable to fix it in a position where normally it will be out of sight. But with modern building practice—this applies particularly to blocks of flats—it is often impossible to hide the meter; and this led to the development of a neat and rigid method of fitting. Attention should be paid to this meter bar, which embodies the best points of German and American practice, and which has many advantages. Among them are the saving in cost, reduction of tool kit, simplicity of exchange, and better appearance.

Both the meter testing device and the safety cut-off have been developed to solve problems arising from the adoption of so many thermostatically controlled low-consumption appliances. With the growing popularity of this type of continuously-operating apparatus came a problem in regard to their installation on premises supplied via prepayment meters. If the gas supply to such an appliance were interrupted, would the consumer remember to re-light it after placing another coin in the meter? Our readers are aware that some appliances are equipped with automatic cut-offs; but the new device of the Gas Light and Coke Company, which is simple and inexpensive, ensures safety not only on prepayment supplies, but on any appliance where by-pass failure or flame extinction might be a source of danger.

Finally, we hope that the section of Mr. LeFevre's contribution dealing with screw threads will be studied with the closeness which the importance of this branch of gas fitting work merits. As the author points out, on the normal small housing estate carcass the average number of screwed joints is no less than 170. It is obvious that the soundness of these joints should leave nothing to be desired.

The Blown Fuse

A CLOSE check upon receipts is undoubtedly the first essential in the conduct of business affairs, and most trading concerns look for their revenue to as many sources as can be legitimately tapped. Particularly is this true of electricity supply undertakings operating in thinly populated country districts and handicapped from the start by heavy capital and management charges. But the goodwill of the consumer is an essential condition of success, and it is bad business to sacrifice that goodwill in order to extract the last shilling of legally legitimate revenue. This fact has been long recognized by the larger suppliers of electrical energy, who do their best to avoid irritating their consumers by the imposition of petty penalties; but it is a view which does not appear to be shared by the management of the West Devon Electric Supply Company, Ltd., who, according to their terms of contract, seek to impose upon the consumer what is, in our opinion, an arbitrary and unjustifiable obligation. In order that the fortunes of this undertaking may not be prejudiced by the burden of replacing blown fuses, the following prophetic utterance is incorporated in Clause 15 of their Supply Contract:

> "The Company will provide main fuses which are sealed, and can be replaced only by the Company's staff."
>
> "In the event of the Company being called in to reinstate a fuse, the consumer shall be charged the sum of 5s. for such replacement."

In other words, the Company seek to bind consumers under agreement to pay 5s. for the restoration of supply, irrespective of the reason which caused the fuse to blow, or of the actual cost of the replacement. In principle, we agree with the need for such a clause. In these days the vendor of electricity has to contend with the jerry wiring contractor, the enterprising amateur, and last, but not least, the foolish person who re-wires his house cut-outs with the first piece of wire which offers itself in his candle or match guided search. There is a definite need for protection against these people, but this can

be obtained without penalizing every consumer by an inevitable and heavy charge for a simple service.

The suppliers can draft a clause under which they reserve the right to debit a consumer in certain defined circumstances with the cost of reinstating a blown fuse, and in our opinion no consumer could rightly object to such a clause. The obligation, however, which the West Devon Electric Supply Company wish to impose upon their consumers is a very different matter, inasmuch as it seeks not only to penalize the user because of a happening for which he may in no way be responsible, but to make the penalty unduly heavy.

Electricity suppliers are well aware that supply fuses can melt for reasons apart from any fault or overload on the house circuits. They are also aware that, in the event of a heavy fault on the user's circuits, it is practically impossible to ensure that the house cut-outs will clear that fault, leaving the supplier's fuses intact. A consumer should be charged with the cost of a fuse replacement only in the event of the house cut-outs having been too heavily fused by the consumer himself. If a wiring contractor is the culprit, the suppliers have their own remedy. As regards the cost of replacing a blown fuse, this is almost entirely a matter of travelling time. The fusible element costs a fraction of a penny, and takes a very few minutes to insert. Incidentally, the consumer himself, on whom the prosperity of an undertaking depends, is entitled to some degree of consideration. In a country district, a failure means inconvenience, dislocation, and in many families a state of nervous tension until the supply is restored.

It so happens that an A.C. change-over is pending in the West Devon district, and as most of the house installations to be turned over are several years old both the suppliers and the users are likely to suffer some inconvenience. Many competent authorities consider the use of 230 volt A.C. for domestic purposes a dangerous practice, and the attendant risks are not rendered less by the amount of cheap and shoddy portable apparatus which is being used in ever increasing quantities.

The Salary Question

It is regrettable to have to point out that from time to time the question of salaries in the Gas Industry comes up for discussion, and invariably on the ground that the remuneration errs in the direction of inadequacy. The "JOURNAL" has always been wishful to do everything in its power to remove a grievance which it recognizes has in some instances only too much justification, and the effect of which upon the Industry obviously must be harmful. It is hard work to raise the status of the profession while there remain gas undertakings whose pay-rolls lend no encouragement to improvement. But with all the goodwill in the world, it is impossible for us to meet the desires of some correspondents who have addressed us recently upon the subject of "The Applicant's Viewpoint." For example, there has been one personal letter containing the suggestion that, in cases where applicants are invited to "state salary required," the "JOURNAL" might refuse to insert advertisements that give no indication of the name or size of the works, &c., on the ground that it is impossible for applicants to calculate the remuneration to which they may be entitled if they are not made acquainted with facts which will enable them to judge of the amount of work, skill, and responsibility attaching to the position. Again, there is the correspondent in last week's issue of the "JOURNAL," who suggests that, when attention is drawn in the Editorial pages to the fact that such and such a vacancy is advertised, the Technical Press might add their valuation of the position, or, better still, allow the Institution of Gas Engineers to advise their members (through the Technical Press) of the value of the post.

However desirable these innovations might be from the applicant's viewpoint, they are outside our province. All that we can do is to call attention once again to a fault which, where it still exists in the Gas Industry, should be promptly remedied. If it is essential that the Industry should secure the best brains and the highest qualifications that are obtainable—and we believe that it is essential—then the Industry must be prepared to do its part. There has been no lack of warning that this is a matter calling for close attention. A year ago, speaking at the annual dinner of the Eastern Counties Gas Managers' Association, Dr. E. W. Smith referred to the difficulty of getting young men to-day to enter the Gas Industry. He said it was worthy of consideration as to why young men did not feel disposed to spend years of their lives preparing to take posts as gas engineers. There might be many reasons, but one of the outstanding ones was that young men were not well enough paid when they were prepared to enter the Industry, and they knew that if they were willing to go in at low salaries they were not likely later on to get the remuneration which should be paid to men of great experience. Until this state of affairs was altered, and gas engineers were not only trained well but paid well, there would never be suitable attraction for young men to enter the Industry. A week or so later, addressing the Midland Association of Gas Engineers and Managers during a luncheon at the annual outing, Mr. R. J. Milbourne expressed the opinion that the profession of a gas engineer should be one of the best paid professions. It was distressing when one saw at times appointments offered at salaries which were not more than would be given to a shop manager. But he thought it a still greater shame that there were evidently applicants to fill the positions. It seemed to him that the matter to a large extent lay in their own hands.

We recognize with Mr. Milbourne the difficulty in the way of applicants raising the level of remuneration while candidates are found who are willing to accept the smaller salaries offered. Our memory goes back to the time when, shortly after the war, it was announced in an editorial in the "JOURNAL" that advance was being made towards the goal of having a National Association of Technical Gas Officials, the work of which would be directed towards improving the status and remuneration of technical gas men, and protecting the interests of those whose conditions stood in need of such influence as an organization of the kind could yield. An Association bearing this title was formed, and the first annual general meeting was held in London in June, 1920, when it was reported that a preliminary meeting had been attended by engineers and managers from all parts of the Kingdom. With reference to actual work done, the Executive Committee reported that they had written the respective chairmen of four different gas undertakings, which resulted in one case in an increase of salary for the manager concerned. Several members had approached their Committees themselves for their salaries to be raised to the scale of the Association, and had been successful. They had also on one or more occasions publicly protested through the Trade Journals against salaries offered.

This is now ancient history, but the problem clearly remains, and once more heads of gas undertakings may be urged to do all in their power to see that salaries paid are commensurate with services expected.

Housing Changes

Not without interest to the Gas Industry—in view of the unfair treatment to which undertakings have been subjected by so many municipal housing schemes—is the announcement of the Government's new Bill, the main object of which is to encourage provision of small houses through private enterprise. This should mean greater freedom for the tenants and consequently for the Gas Industry. The proposal is to do away with the existing subsidy, and to pave the way for Building Societies to finance the erection of houses suitable for letting purposes. The basis of this scheme is that, with the fall in building costs and with cheaper money, the subsidy is no longer needed. The houses in mind are such as would be let at round about 10s. per week, including rates, and the tenants should prove good gas consumers, if they are not obliged to have recourse to that other commodity which ofttimes makes up in cost anything which (from the working man's point of view) it may lack in suitability.

PERSONAL

MR. G. R. BULLWINKLE.

The Directors of the South Metropolitan Gas Company have appointed Mr. G. R. Bullwinkle Engineer at the Company's Vauxhall Works.

Mr. Bullwinkle, states the Company's Co-Partnership Magazine, was born in London in 1887, and was educated in engineering at the East London Technical College. He was afterwards apprenticed to Messrs. J. Richmond & Co., Ltd., engineers, of London. In 1908 he joined the staff of the Commercial Gas Company as Assistant District Engineer.

Shortly after the outbreak of the war, he joined the 12th Battalion London Regiment (The Rangers), and served in France from December, 1914, until he was wounded in April, 1915. At the end of 1915 he was granted a Commission in the Royal Garrison Artillery. He returned to France in January, 1917, and remained until he was demobilized in June, 1919.

On his return to the Commercial Gas Company, Mr. Bullwinkle was transferred to the Works Department as Engineering Assistant at the Stepney Works. In January, 1926, he was appointed Assistant Works Engineer at the Poplar Works, and in July, 1929, Works Engineer at Wapping. He was elected a Graduate of the Institution of Mechanical Engineers in 1907, and an Associate Member of the same body in 1914.

* * *

The marriage of Gladys Marjorie, daughter of Major and Mrs. Frank Middleton, of Cotefield, Wortley, near Sheffield, to Stanley Herbert Morgan, son of Mr. and Mrs. Edward Francis Morgan, of Coombe Dell, Croydon, will take place at All Souls' Church, Langham Place, London, to-morrow at 12.30 p.m.

* * *

Mr. WILLIAM HILL, who has been Engineer and Manager to the Stalybridge Corporation Gas Department since 1901, retired on Saturday last on superannuation. Before leaving, he called together all the employees, and told them he was severing his connection with the works, and expressed to them all his sincere thanks for their loyal service and for their excellent co-operation with him in the work of the undertaking.

* * *

Mr. H. HALMSHAW has resigned from the staff of the Woodall-Duckham Companies in order to take up consulting work at 53, Victoria Street, Westminster, S.W. 1, specializing in coal preparation and treatment. Mr. Halmshaw is a qualified Mining Engineer, and during the past few years he has gained an intimate knowledge of the contracting business. He has made a special study of British and Continental coal-cleaning practice.

* * *

Ex-Alderman GEORGE WALKER, lately-retired Lord Mayor of Bradford, has retired from municipal life after a quarter of a century on the City Council, during the past 21 years of which he has been a member of the Gas Committee, and was Chairman of the Committee for eleven years until accepting the Mayoralty in November, 1931. The Bradford Gas Committee have passed a resolution placing on record their appreciation of his long services and their high regard for him.

CORRESPONDENCE

Second Report on the Back-Run Process for the Manufacture of Carburetted Water Gas

31st Report of the Joint Research Committee of the Institution and Leeds University

SIR,—Whatever the opinions for and against the "back-run" method of water gas making may be, the Report and the subsequent discussion are definite on one point—namely, the importance of the influence of ash on the water gas process.

Almost every contributor to the discussion, both verbal and written, referred to problems created by the ash and its clinkering propensities under varying working conditions, and according to the composition of the ash in the coke gasified, as demonstrated in Appendix 5 of the Report.

It appears to me that the Joint Research Committee would be well advised when carrying out further investigations on the water gas process, to select conditions under which the disturbing factor of ash could be eliminated or reduced to a minimum. In my paper on "Clean Coal in the Gas Industry," read before the First International Gas Conference and Institution Meeting in June, 1931, I reported results of comparative tests on C.W.G. making from ordinary coke containing 8% of ash and coke containing 3·4% of ash made from "clean coal."

These results were obtained in the ordinary routine of the particular works, and, although accurate as far as they go, cannot claim the completeness and detail of work carried out under special research conditions. The differences in favour of the "clean" coke are, however, so important that they should deserve the most searching investigation by such an authoritative body as the Joint Research Committee.

As it was stated in the course of the Autumn Research Meeting of the Institution that Dr. Dent and his staff are to carry out further work on water gas plant at Croydon, I suggest that this opportunity should be utilized for getting down to fundamentals. I am well aware that in the opinion of many such work should be carried out with coke from coals as they can be at present obtained, but I am equally insistent that, in order to force the coal industry to supply the right raw material for the Gas Industry, it is necessary to demonstrate and assess the difference in value between ordinary and clean coal.

I may be permitted to refer to the discussion on Mr. Cunnold's paper on "Modern Water Gas Plant," read before the Southern Association on March 30, 1927. Having pointed out the influence of low ash and that of catalysts

Research Report No.	7			27	31						R. Lessing.	
Test No.	1	2	3	—	1	2	3	4	5	6	Coke from "Uncleaned" Coal.	Coke from "Clean" Coal.
—	—	—	—	Back-Run.	Back-Run.	Back-Run.	Down-Run.	Down-Run.	Down-Run.	Back-Run		
Ash in coke (dry), %	12·1	11·2	10·4	8·9	8·6	8·6	8·2	9·0	8·3	8·0	7·9	3·4
Coke (dry) per 1000 c.ft. C.W.G., lbs.	35·51	36·15	35·32	34·08	34·8	34·1	35·3	37·6	40·3	35·1	32·5	32·7
Oil per 1000 c.ft. C.W.G., galls.	1·826	1·830	1·854	2·11	2·029	0·867	1·909	0·905	0·974	1·970	1·69	1·78
C.W.G. per ton of dry coke, c.ft.	63,090	61,960	63,420	65,720	64,350	65,720	63,530	59,620	55,520	63,790	68,560	68,400
C.W.G., B.Th.U. per c.ft.	484	481	485	503	495	390	491	395	398	493	424	463
C.W.G., therms per ton of dry coke	305	297	308	330	318	256	312	236	221	315	292	318

on the reactions taking place in carbonization and water gas making, I expressed the view that " the time was near when gasification efficiencies will be obtained far in excess of those possible to-day."

The justification for this forecast is shown in the results given in my paper quoted above. The increase in gas or therm production per hour amounted to 39%. The steam requirements with " clean " coke were only 72·3% of those for ordinary coke, while the clinkering time was reduced by 48·3%.

In view of a criticism made in the discussion on my paper by Dr. E. W. Smith that my Tottenham tests did not follow normal practice, I have collated the principal results obtained in the 7th, 27th, and 31st Reports of the Gas Investigation Committee in the table on p. 734.

The table shows that the results obtained in my tests under routine conditions with a hand-operated set fall well into line with the results given in the various reports of the Committee.

The advantages of the use of " clean coke " over ordinary coke demonstrated in my tests were so apparent that a good case seems to be made out for basing the tests proposed to be carried out by the Committee at Croydon on a coke free from the disturbing effects of ash, which tend to vitiate some of the results and obscure the conclusions drawn from them.

Yours, &c.,
R. LESSING.

50, *Queen Anne's Gate, S.W.* 1,
Dec. 10, 1932.

Prevention of Bribery

SIR,—Bribery is a subject that is none the less of capital importance to business men because it is not easy to discuss on paper. The Bribery and Secret Commissions Prevention League, of which I have just become President in succession to the late Lord Inchcape, has behind it a quarter of a century's useful work and deserves the strongest backing, even in these embarrassed times.

Advice is given annually by the league to some hundreds of inquirers whose interests have been unfairly affected by the practice of bribery, and who are unfamiliar with the Prevention of Corruption Act and with other less formal remedies. A sustained effort is made by the League, and with some success, to keep public opinion alive to these serious issues. The cautioning and, as a last resort, the prosecution of offenders are further effective weapons. The net result of the League's existence has been to provide a most valuable brake on the progress of bribery and corruption in this country.

It would, I suggest, be a short-sighted policy that withheld a subscription of one guinea that may properly be regarded as an insurance premium often covering many thousands of pounds. I wish to appeal, therefore, to your readers to support the League by giving donations, or, better, by becoming subscribers, and lending the weight of their names. Particulars can be obtained from the Secretary of the League at 22, Buckingham Gate, S.W. 1.

Yours, &c.,
D. MILNE-WATSON,
President.

Bribery and Secret Commissions Prevention League, Incorporated,
22, *Buckingham Gate, S.W.* 1,
Dec. 9, 1932.

Bottled Gas at Sea

SIR,—I read your reference to my yacht-home with much interest in your issue of Nov. 30.

Since Mr. Bonsey wrote to you on this subject, I have had several other lighting points fitted with attractive modern burners. I also have a well fitted workshop on shore heated by gas and illuminated with Sugg and other lamps giving 1530 c.p.; a gas forge and soldering equipment are in constant use; and I light the quay with a clock-controlled Staniforth street lamp.

I am looking forward to the time when I can carry " bottled gas " at sea not only on this craft, but on a motor cruiser I am now building, probably the only one constructed to be propelled by side paddle wheels and a screw driven by two independent petrol engines. On this I hope to have gas cooking, heating, and lighting.

I might add to your historical reference to gas on board ship by saying that the *Great Eastern* steamship of 1858, on which I am writing a comprehensive history, contained a " Gas House " for the purpose of making and supplying gas to light the cabins. In the builder's plans a telescopic holder and condensers are drawn.

However, this was never fitted up, owing to the original company failing and the protracted launching, which cost some £40,000.

Gas lighting was in use at a later period on the great steamers running on the rivers in U.S.A., but I do not know if gas was made on board.

The Gas Lighted Yacht "Mamgu."

Personally I consider gas lighting is vastly superior in every way to any other system, and illumination has long been a hobby with me. I still have an oil and candle installation on board as well as electric light, but never will I adopt the Government-aided " grid."

I enclose you a photo. of *Mamgu*, and wish your excellent Journal every success.

Yours, &c.,
R. V. E. DE B. CRAWSHAY.

Yacht " Mamgu,"
Hythe Quay,
Maldon,
Dec. 10, 1932.

Continuous Meter Reading and Billing

SIR,—Mr. Carmichael asks in your last issue for the experience of companies who have adopted continuous meter reading.

We introduced the system at Bedford about two years ago, together with monthly billing, and I have no hesitation in saying that it is most popular and has done much to improve the relations between the Company and its consumers.

The clerical task of the billing has thus been equalized, each day dealing with the same number of accounts. The showrooms are receiving about the same amount daily; consequently credit posting remains the same from day to day.

At first there were quite a number who requested that their accounts should be rendered quarterly as before, but these have gradually come into line. We suggested that we should continue to bill them monthly so as to provide a better check on their consumption, and offered them the suggestion that they should allow the accounts to accumulate for three months. This met the objection in every case.

Industrial consumers, of course, require their meters to be read at the end of each month, but in the case of domestic users no one seems to object to the dates provided it represents a month's consumption.

Our slot meters are collected in a similar manner, and in this case we complete the cycle twice in each quarter.

Yours, &c.,
J. B. HANSFORD,
Engineer and Manager.

Bedford District Gas Company,
Dec. 9, 1932.

THE NEWS OF THE WEEK

Three Members of the Staff of the Glasgow Corporation Gas Department, it is suggested by the Committee, are to be sent to Birmingham with a view to inspecting and reporting on the experiments which are being carried on there in regard to the use of compressed gas as a motor fuel.

A Scheme for a New Gas-Works may be put in hand at Blackpool shortly. The project is estimated to cost about £250,000. A committee is about to consider the purchase of a site of 58 acres on the outskirts of the town. The works will be transferred gradually from the present site, the operation taking ten years.

The Affairs of the Limerick Gas-Works come in for prominent reference in a report by the Free State Local Government Inspector (Mr. J. MacLysaght), who, following a sworn inquiry into the administration of the civic affairs of Limerick, recommends the appointment of a Town Manager to take over the powers and duties of the Corporation.

Gas Supply in Turkey.—According to the report of the Société Turque de Gaz et d'Electricite à Istanbul et d'Entreprises Industrielles "Satgazel," the sales at the Company's Gas-Works at Stamboul during the past year amounted to 41 million c.ft., compared with 28 millions in 1930—an increase of about 46%. The number of consumers during the same period advanced from 1495 to 1990.

Correspondence has Taken Place between the Nitshill and Hurley Gas Light Company, Ltd., and the Glasgow Corporation Gas Committee in regard to a proposal by the Company to sell their undertaking to the Corporation, it being situated within the Corporation's area of supply. The Committee have appointed a Sub-Committee to consider and report on the matter, and, if necessary, negotiate with the Company.

The Closing of the Maclaurin Plant at the Dalmarnock Works of the Glasgow Corporation Gas Department was referred to at a recent meeting of the Gas Committee, and the General Manager was instructed to report upon the possibility of utilizing the plant for other purposes than the manufacture of low-temperature smokeless fuel. Mr. J. W. M'Lusky now submits a proposal for the conversion of the plant to manufacture carburetted water gas, and the Committee have agreed to consider the suggestion and ask for further details.

Ottoman Gas Company, Ltd.—The Directors' report for the year ended Dec. 31, 1931, states that they regret that the revenue account shows a further loss of £3008. The accumulated loss as at Dec. 31, 1931, amounts to £44,572. The Company has been unable to pay any interest on the debentures since February last. Nor were there any funds available for the redemption of the debentures, which fell due on July 31 last. The Directors were accordingly compelled to convene a meeting of the debenture holders; which was attended by a representative of the Ottoman Bank. Mr. Charles James Daun having retired from the office of Secretary, the Directors have appointed Mr. Grenville Murray Burton, M.A., A.C.A., to fill the vacancy thus caused, and Mr. Daun has joined the Board.

Electricity Charges in Yorkshire.—The Thorne local Council held a special meeting last week to consult a representative of the Electrical Distribution of Yorkshire, Ltd., with a view to securing a reduction in the price charged for electricity for public and private lighting. It was pointed out that the price of gas supplied by the South Yorkshire and Derbyshire Gas Company was considerably less than that for electricity, and that the Gas Company had intimated a further reduction in price to date from Jan. 1. The Electrical Company's representative replied that it was impossible to reduce the price of current at Thorne below that charged elsewhere, and he could hold out no prospect of such reduction. Whatever the Gas Company's charges were going to be the Electrical Undertaking could not afford to charge less than the present price.

The Second Series of Cookery Demonstrations and exhibition of gas appliances, which was held that week under the auspices of the Coventry Corporation Gas Department, was opened on Dec. 5 by Mr. G. E. Roberts, the Chairman of the Gas Committee. Mr. Roberts referred to the increased use of gas for domestic purposes and mentioned some recent developments in gas appliance. The object of the demonstration is to show how the greatest service can be obtained from the correct use of automatically-controlled gas cookers.

The Mayor of Hereford (Mr. Bernard Powell) officially opened the first of a series of cookery demonstrations in connection with the Hereford Gas Department. In declaring the demonstration open the Mayor referred to the cheapness and efficiency of gas for cooking purposes and its effectiveness as an illuminant, mentioning that Victoria Square, Birmingham, which was lighted by gas, was the most beautifully lighted square he had seen in the country. Demonstrations will be given each day by Miss White, of Radiation Ltd.

Continuing the Series of Lectures to the Outdoor Staff of the Sheffield Gas Company, 75 employees, chiefly comprised of fitters and maintenance men, were addressed on the subject of "Hot Water Circulation" by Dr. Winter, in arrangement with Messrs. Wilsons & Mathiesons, Ltd., at the Chief Showrooms, 15-17, High Street, Sheffield, on Friday night last. The address, which was illustrated by lantern slides, embraced the various forms of appliances now available for the generation of hot water. The lecture was much appreciated by those present, and an interesting discussion ensued at the conclusion.

Gas Exhibition at Sowerby Bridge.—Mr. E. H. Hudson, Engineer and General Manager to the Normanton Gas Company, was the official opener, last week, of an exhibition of appliances which is being held for several weeks in the Sowerby Bridge Town Hall, under the auspices of the Urban District Council, in conjunction with various firms of appliance makers. Councillor A. Fishwick, J.P., presided in the absence through illness of the Chairman of the Gas Committee (Councillor J. W. Whiteley, J.P.), and mentioned that unfortunately Mr. A. W. Bissell, the Engineer and Manager, was also unavoidably absent through indisposition.

Following the Inquiry in London into the application of the Sunderland Gas Company for a special order, the Finance Committee of the Sunderland Corporation has reported that having regard to the suggestion that the parties should confer with a view to an agreement being reached, the Committee has informed the Company that, while they are of the opinion that provision which would enable increased dividends to be paid at the present time should not be allowed, they are agreeable to meet the Directors and Officials of the Company to discuss the matter. In the event of an agreement not being reached the Corporation will continue its opposition to the application.

A Visit to a Gas Appliance Factory.

About fifty members of the Midland Junior Gas Association paid a visit to the works of Messrs. John Harper & Co., Ltd., Willenhall, on the afternoon of Thursday, Dec. 1. The visitors were welcomed by Mr. C. Holland Harper, Mr. John H. Harper, and Mr. Maurice Slater, the Managing Directors of the firm.

During the afternoon they saw the many operations in the very extensive foundry and also had an opportunity of witnessing the manufacture and assembly of various gas appliances, the method of enamelling gas fires and cookers being of particular interest.

At the conclusion of the inspection, the members were entertained at tea, and a vote of thanks to the firm was proposed by the President, Mr. F. A. C. Pykett, and seconded by Mr. S. K. Hawthorne, Senior Vice-President, Mr. C. H. Harper suitably replying on behalf of the Company.

THE NEWS—*continued.*

South-Eastern Gas Corporation, Ltd.

Messrs. Dawnay, Day, & Co., and Edward de Stein & Co. have jointly acquired controlling interests in a number of gas undertakings in Kent, including the following: The Folkestone Gas and Coke Company (incorporating the Hythe and Sandgate Gas Company), the East Kent Gas Company, Ltd. (incorporating Wye, Chilham, and Bridge Gas Companies), the Deal and Walmer Gas Company, and the Whitstable Gas and Coke Company, Ltd.

The holdings acquired will be taken over by South-Eastern Gas Corporation, Ltd., a new holding Company, which has been formed under the auspices of the firms mentioned above, with an initial capital of £323,000. The new Company will concern itself with the co-ordination of financial and technical administration and policy. The identities of the individual gas companies are to be carefully maintained.

The first Directors of South-Eastern Gas Corporation, Ltd., include Major Julian Day, of Dawnay, Day, & Co., Mr. K. W. Hickman, of Edward de Stein & Co., and Mr. G. M. Gill.

It is understood that the developments announced represent the first steps in a broad programme of co-operation and co-ordination in this field by the new Corporation.

The offices of the South-Eastern Gas Corporation will be at 15, Moorgate, E.C. 2.

Institution of Gas Engineers.

Members of the Institution are invited to attend the 23rd Annual Exhibition of Scientific Instruments and Apparatus arranged by the Physical Society at the Imperial College of Science and Technology, Imperial Institute Road, South Kensington, S.W. 7, on Tuesday, Wednesday, and Thursday, January 3, 4, and 5, 1933, at 3 p.m. to 6 p.m. and 7 p.m. to 10 p.m.

Tickets of admission for Jan. 3 and 4 may be obtained from the Secretary of the Institution, 28, Grosvenor Gardens, London, S.W. 1, from whom copies of the Catalogue may be obtained, price 9d. each, including postage. Tickets of admission for Jan. 5 are not required.

Gas Supply Developments in Belgium.

The Compagnie Generale du Gaz et d'Electricité of Brussels, in its recently-issued report for the financial year 1931-22, mentions that in June last it assisted in the formation of a new Company with the title of the Société Bruxelloise du Gaz, with a capital of 50 million francs (approximately £400,000), to take over from the Compagnie Generale all the installations in connection with gas supply in one district of Brussels and also in Anderlecht, Schaerbeek, and nine other Belgian Communes.

The new Company has secured a monopoly of gas supply in the various districts mentioned until the end of 1954. At the end of the year the Compagnie Generale and the concerns in which it is financially interested were supplying gas to 215,285 consumers—an increase of 3·7% over the preceding year.

Gas in the Fish-Frying Trade.

The thirty thousand fried fish shops of this country buy over 60% of the total fish landed by British trawlers. This figure shows the rapidly growing importance of the fish-frying trade.

The fried fish shop of to-day is very unlike the fish shop of a few years ago. Then the shops were steamy and odorous and the ranges were ornate, ugly, and hard to keep clean. To-day the ranges are of simple and good design and notable for their cleanliness. The smell of oil and fish is almost completely absent.

This is largely due to the increasing use of gas-fired fish frying ranges. Besides being clean and efficient, these ranges draw the steamy air into the flue and discharge it well above the roof.

In Birmingham, Leeds, Manchester, and Sheffield there are about 2220 fried fish shops. Well over a thousand of these are already equipped with the new gas ranges. In Great Yarmouth forty out of the fifty friers are now using gas.

"Fish Frying Up-to-date" (issue No. 225 of "A Thousand and One Uses for Gas") contains information and photographs which should be of interest, not only to every fish frier, but to many of the general public who take advantage of this easy and quick means of obtaining a wholesome and palatable food cooked ready for eating. A copy of the book can be obtained free of charge on application to the British Commercial Gas Association, 28, Grosvenor Gardens, S.W. 1.

Low Temperature Carbonisation, Ltd.

The accounts of Low Temperature Carbonisation, Ltd., for the year ended Oct. 31 shows a trading profit of £39,079, while interest received on debentures in Doncaster Coalite, Ltd., amounted to £9167. After providing for expenses, Directors' fees, £12,000 for interest on Debentures, and £5899 for depreciation, there remains a profit of £15,138. The profit does not include any profit on the smokeless fuel, oil, and petrol made at the Askern Works of the Subsidiary Company, Doncaster Coalite, Ltd. Cash is shown at the increased figure of £37,369, and stocks and debtors amount to £33,102. Creditors, £23,385; amount owing to Subsidiary Company, £10,041.

Sales advanced by £27,253 to £222,163. Both works operated all the summer at full capacity, and all stocks were cleared as made. The works at Askern were extended during the course of the year by 50%, only coming into full operation just before the end of the financial year.

The Directors are taking steps for the establishment (if possible) of hydrogenation plant to treat 20,000 tons of Coalite oil produced annually from coal.

There are now 556 retorts installed for operating the Coalite process, with throughput of 322,400 tons of coal per annum. Orders for all products exceed production.

Cooking by the "Most Uneconomic Means."

A series of articles on the "Back to the Coal Standard" movement is being published by the "Western Mail." The contributor to the issue of Nov. 24 is Capt. Bernard Ackworth, D.S.O., R.N., who states:

"With the steady elimination of electric traction, which is highly economic if current is generated and distributed locally, it may be wondered where the demand for the enormous output of power from the electrical grid system is to be found, an output which has risen in the past ten years from 4,884,666,038 units to 12,809,350,246. The answer is simple. Every humble cottage in remote districts is to be given the advantage of an electric bulb, and the inmates are to be permitted, if not compelled, to cook their dinners by the most uneconomic means which the wit of man has yet devised. To carry this heavy financial loss the price of electricity locally and in bulk is necessarily raised, with the result that in South Wales one large factory to the author's knowledge, and probably others, has installed a self-contained Diesel plant.

"COMPULSORY ELECTRIFICATION."

"Lest householders should be indisposed to use costly electricity in preference to cheap gas, Socialist councils will see to it, as indeed they are already seeing to it, that the use of electricity is compulsory in the growing number of Socialist houses, to the great detriment of the free and independent gas concerns whose product is not only cheaper and, therefore, more desirable, but which in most cases is actually preferred. Indeed, in some districts where town councils do not cement up the gas pipes the unhappy tenants of council houses receive notice to quit unless they consent to use electricity. Some idea of the power of town councils to promote Socialist lighting and heating schemes can be obtained from the fact that uneconomic housing schemes have cost the taxpayer about £15,000,000 in the present year. London ratepayers alone are said to be paying about £26 per annum out of their rates for council houses occupied, not by the poor, but by well-to-do folk."

Burnley and Coke Oven Gas.

Gas Engineer's Statement.

Members of the Burnley Town Council made their annual inspection of the Corporation's gas-works recently, and Mr. J. Herbert Clegg, the Gas Engineer, in the course of an explanatory address to the members, remarked:

All the gas used in Burnley and district was manufactured at the Parker Lane Works until November, 1927, when the Oswald Street Works were started up. Of their type these latter works are still among the most modern, and can produce gas as cheaply as any gas plant in the country where the price of coal used is on the same basis for the same quality, and where the wages are in accordance with the grade paid by this Corporation.

The type of retort is the horizontal, high-temperature carbonization, as being the most suitable to carbonize Burnley coals, and they produce an excellent coke which is all the more valuable because it is dry-cooled by the Sulzer plant. The Sulzer plant is of Swiss origin, and was the first of its type to be erected in this country. Glasgow and Liverpool have followed suit, and Fords have put down a 1000-tons per day plant at Dagenham.

The site was originally laid out to contain three units

THE NEWS—*continued.*

each of 3 million c.ft. per day capacity, and one unit only was first proceeded with, although the maximum daily output required was 4½ million c.ft. The Committee knew that a local colliery was contemplating the installation of a plant for low-temperature smokeless fuel which would produce a quantity of gas as a bye-product, and which would therefore be available for purchase. They also wished to consider the prospects of Burnley's requirements, as even in those comparatively rosy days it was felt that Burnley's cotton trade was in a position of jeopardy.

In 1928-29 the results produced from Oswald Street demonstrated how uneconomical gas-making was at the Parker Lane Works, so the Committee had to consider alternative supplies or an installation of No. 2 unit of works at Oswald Street in order to permit of scrapping the Parker Lane Works.

Coke Oven Gas Supply.

The local colliery had decided not to proceed with a low-temperature carbonization plant, but to amalgamate with two other collieries in the erection and working of a coke oven plant at Altham, which would be largely supplied by Burnley coal. The Lancashire Foundry Coke Company therefore offered a supplementary supply of coke oven gas to this Corporation, which was finally accepted to the extent of a quantity of 1,500,000 c.ft. per day—sufficient to maintain a maximum day's supply while still running the Oswald Street Works.

The cost of this gas into holder works out at practically the same price as we can produce it, but, in addition, we save the interest on the further capital which would have required to be expended to produce the additional quantity required—*i.e.*, approximately £4000 per annum for a period of ten years. At the same time we were told that the coal mined for these coke ovens would provide work for 200 Burnley colliers, as the coke ovens require three times as much coal to produce the same gas as we do in our own manufacture. The Corporation also receive the benefit of the rating on this extra coal produced.

I have gone to considerable length to explain the position regarding the purchase of coke oven gas, as many of the ratepayers in this town wrongly think that the Oswald Street Works are not employed and that the money there laid out was unwisely expended.

The annual figures approximate in a purchase of 50% of coke oven gas, and a manufacture of 50% of our own production, or respectively approximately 75% and 25% in summer, and 60% and 40% in winter. As the output of gas to the town increases, the proportion of our own manufacture will increase up to the limits of the plant laid down, which will be 66% Burnley gas and 34% Altham gas. If the Oswald Street plant had been extended it would have required to be shut down for eight months of the year, and even the existing plant closed down to half its capacity for two months in summer.

The works are designed to use what would otherwise be waste heat to the fullest extent, largely in the production of steam for works use and for the generation of electricity. The exhaust steam is even collected and used for the central heating of the works buildings and for process work in the chemical branch. In addition to the gas-making plant, we have a small chemical works.

In considering the present development in the Gas Industry, the manufacturing side has made wonderful strides since the war, especially when one considers that with an average cost of all materials and labour expended of over 80% above pre-war figures, the average selling price of gas is only increased by 20%; so we are now able to concentrate on the development of uses and sales of gas.

In this connection I may remark that we have just completed the laying of a gas main to Duckpits Sewage Disposal Works for the direct generation of electricity there at a competition price with the Corporation's supply.

The practice of extracting benzole from the gas for motor vehicles is again coming into vogue, and provides for a substantial revenue to those gas undertakings who resort to this practice. Unfortunately the extraction brings in its train certain disadvantages which would be to the detriment of the Burnley gas consumers, so that I have no desire to place such a scheme before you at the present time.

The utilization of gas for propulsion of motor vehicles ought to be our objective, as providing for a potential increase in our load of about one-sixth of our present output of gas.

Welsh Coke for Rumania.

A triumph of marketing methods, states the Cardiff correspondent of the "Times," is revealed in the announcement that cargoes of Welsh coke have reached Turnu Severin, on the borders of Yugoslavia and Rumania. The coke was shipped from Cardiff to the coast of Yugoslavia, and thence taken by rail for about 350 miles through mountainous country.

Owing to the difficulties of the land route future consignments will be shipped to Ibrail, in Rumania, and thence taken by canal to Turnu Severin, a distance of 400 miles. The total distance covered by sea and canal is nearly 4000 miles.

Already 15,000 tons of coke have been shipped, and further cargoes are to follow. The total quantity of coke exported from Cardiff for the 10 months of this year amounts to 124,000 tons, which is nearly 25,000 more than the quantity for the corresponding period last year.

NOTES ON PLANT AND PROCESSES

A Fool-Proof Lighting Burner.

How often does the prestige of gas lighting suffer as a result of a consumer "fiddling" with his burner adjustments in the attempt (too often fruitless) to obtain a better light? Few, indeed, outside the Industry understand how to get the best out of their lighting burners, once the adjustment of gas and air has become upset.

A new burner just placed on the market by Messrs. Falk, Stadelmann, & Co., Ltd., of 83-93, Farringdon Road, London, E.C. 1, would seem to have solved this problem, and, in addition, is claimed to eliminate completely the flickering of the light even when subjected to severe draught. This burner embodies what has been termed the "Veritas" Automatic Air Screen—a device fitted over the air inlet port immediately below the gas regulator and louvred on the under side. By means of this screen the burner automatically takes just the right amount of air in accordance with the amount of gas passing, with the result that only a simple turn of the gas regulator is necessary for any adjustment, thus entirely eliminating the consumer's difficulty in obtaining the maximum lighting efficiency and ensuring satisfaction.

It is understood that tests have been carried out on the device over a large area with considerable success; and a further advantage claimed is that it is as impervious to dust as it is to draught.

In short, the "Veritas" Automatic Air Screen controls both gas and air supplies with one adjustment, and Messrs. Falk, Stadelmann, & Co. can now supply the screen as standard with their "Maintenance" burners.

Meter Improvements.

United Gas Industries, Ltd., comprising in relation to meters the firms of Willey & Co., Ltd., Smith Meters, Ltd., J. H. Robinson & Co. (Liverpool), Ltd., and the Sutherland Meter Company, Ltd., have evolved products with a marked increase in efficiency.

The "Radial" valve meter and the plough valve "Flexible Output" meter have helped to reduce the sizes and types of meters for district use.

The "Du-Slot" Meter, when operated by a penny or a shilling, has a strong, simple, and positive coin action which is relatively silent in operation. The reduction gear is simple yet positive under all conditions, and the scale showing prepaid gas is distinct and also positive.

A departure in this type of mechanism is the provision of two slots for a penny and a shilling. This gives the consumer greater confidence to insert shillings. Should the shilling be inadvertently placed in the penny slot it is ejected immediately, before operation is possible.

A special dust shield is fitted on the prepayment valve which prevents rust deposits collecting on the valve seating. The whole of the prepayment and valve mechanism is outside the meter proper and is easily accessible on the district, the removal of a top cover being all that is necessary.

These firms have long been noted for meters of quality, and further co-ordinated research has given the Gas Industry better meters than ever for 1933.

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T.I.C. PROCESS IN FRANCE*

Preparation of Road Tar at Montbéliard Gas-Works

By A. EICHELBRENNER.

Among the plastic binders employed for the surfacing of roads, coal tar is the most important and is used in increasing amounts year by year. The annual French consumption of tar on the roads is approximately 600,000 tons. This result has only been achieved by providing the highway authorities with a treated tar known as Road Tar and having properties complying with the E.P.C. (Ecole des Ponts et Chaussées) Specification laid down by the Department of Bridges and Roads.

Crude tar has, it is true, been used for many years for the maintenance of roads, though it has been employed to counteract dust and not as a real surfacing material.

Since it would be impossible to form any exact estimate of the value of a road made from an unstandardized tar containing hydrocarbons varying with the nature of the coal carbonized and with the type of carbonizing plant, and, moreover, always containing water, the E.P.C. Specification (which is very similar to those adopted in other countries) has laid down, with certain tolerances, the characteristics of a tar capable of giving, by itself or in admixture with bitumen, a binder perfectly suitable for the surfacing of roads.

The chief requirements of such a tar are as follows:

(1) It should penetrate as deeply as possible into the upper layers of the road at the moment of application.

(2) It should harden and at the same time maintain its elasticity while yet adhering strongly to the road material.

With a view to obtaining a product having these properties, the E.P.C. Specification has laid special emphasis on the following points:

(1) *The Content of Oils Distilling Below* 170° *C. Must be Less than* 1%.

This limit ensures that the ammonia liquor, which might be likely to attack the limestone of the road, has been removed.

(2) *The Content of Oils Distilling Between* 170° *and* 270° *C. Must be Between* 12 *and* 24%.

These oils help to give the tar the fluidity necessary for spraying. In addition, they contain tar acids which can give rise to resinification. After application of the tar, these oils resinify and thus give a certain elasticity to the surface.

(3) *The Content of Oils Distilling Between* 270° *and* 320° *C. Must be Between* 6 *and* 15%.

These oils, which are akin to the anthracene oils, largely provide the adhesive properties of the tar. The content of these oils may vary widely without any appreciable effect on the quality of the tar.

(4) *The Naphthalene Content Must be Below* 6·5%.

It is necessary to avoid excess of naphthalene, since this hydrocarbon has the property of subliming, and thereby fissures are caused in the surface of the road covering under the influence of the sun.

(5) *The Content of Free Carbon Must be Between* 5 *and* 22%.

The free carbon serves to give a high agglutinating power.

(6) *The Viscosity, Measured by Means of the E.P.C. Viscometer, Must be Between* 3 *and* 100 *Seconds at* 18° C.

(1-15 seconds by the Hutchinson tar tester at 25° C.)

Tars from horizontal retorts and also from intermittent chambers give products complying with the E.P.C. Specification by straight distillation to 200°-230°.

It is different in the case of continuous vertical retort tars, since these tars have a higher content of light, middle, and anthracene oils, a higher content of liquor, and a very low content of naphthalene. Hence straight distillation to 200°-230° C. does not suffice for the preparation of road tar.

It is thus natural that it should have been in England, where 65% of the coal carbonized in gas-works is treated in continuous vertical retorts, that investigations were carried out with a view to the development of a practical process for treating such tars.

The Woodall-Duckham Company directed its researches towards continuous distillation, and it is about ten years since its T.I.C. lead bath plant was introduced in England, where there are now many installations at work.

The process was introduced into France by the Compagnie des Compteurs of Montrouge, and they designed and erected the tar treatment plant at our works at Montbéliard.

The following is a brief description of the principle of the T.I.C. process:

(1) The tar is distilled in a thin layer, $\frac{1}{16}$ in.-$\frac{3}{16}$ in. thick; hence only a small volume of tar is in the still at any moment. The tar circulates continuously over a bath of molten lead and, since the surface of the

* Paper read before the 55th Congress of the Union Syndicale de l'Industrie du Gaz en France at Paris, June, 1932.

MONTBÉLIARD TAR PLANT.

latter is perfectly horizontal, a constant thickness of the tar layer is ensured.

There is thus intimate contact between the molten metal and the tar; hence heat interchange is perfect, and evaporation of water and oils occurs rapidly without danger of priming.

(2) The process is carried out at atmospheric pressure.

It is thus evident that the T.I.C. process gives the maximum safety in operation and that there is no fear of the accidents which may occur when large volumes of tar of high liquor and light oil content are distilled.

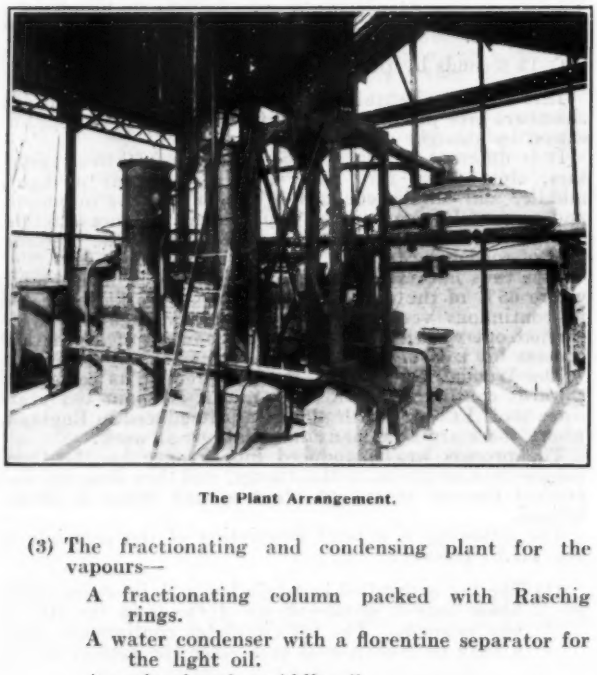
Contrary to the case of coil stills, the T.I.C. still is very easy to clean, since the dimensions of its cover render possible access to the whole surface of the lead.

The complete installation comprises:

(1) A plunger pump with variable stroke which supplies tar continuously to the still. A heat interchanger between the pump and the still enables heat to be recovered from the treated tar.

(2) A pitch pot situated at the outlet of the still receives the treated tar, and a steam inlet enables dry steam to be injected for completing the treatment to the necessary extent.

From the outlet of the pitch pot, the treated tar travels to the mixing or storage tanks having first passed through the above-mentioned heat interchanger.



The Plant Arrangement.

(3) The fractionating and condensing plant for the vapours—

A fractionating column packed with Raschig rings.

A water condenser with a florentine separator for the light oil.

A cooler for the middle oil.

Two naphthalene crystallizing pans for use in the treatment of tars containing naphthalene.

The construction of these parts with bundles of straight tubes facilitates cleaning, since all the sections are readily accessible.

The still, which is mounted on a brickwork foundation, is generally coke fired. The grate is adapted for the burning of small sizes of coke, $\frac{3}{4}$ in., 1 in., and $1\frac{1}{8}$ in. The size of the coke may be varied depending on the way in which the still is worked.

The gas-tight ash pan is provided with a steam injector whereby combustion may be regulated very sharply. The consumption of small coke or breeze varies between 4 and 6% of the weight of crude tar, depending on the liquor content of the tar. Since the latent heat of evaporation of water is very much higher than that of the oils, it is very desirable to settle the tar as far as is possible prior to distillation.

Operation of the plant is very simple, and requires but a visit every 30 or 40 minutes to stoke the furnace and verify the temperatures of the lead and of the outgoing tar. For this purpose there is a dial thermometer in the lead and a recording thermometer in the stream of outgoing tar.

Labour costs are thus reduced to a minimum. At Montbéliard one man on an 8-hour shift looks after the manufacture of sulphate, benzole, and road tar, and also takes charge of the gas right from the foul main to the station meter.

Special Treatment for Continuous Vertical Retort Tar.

This tar, in view of its composition, requires special treatment for the production of road tar.

If the tar is treated at 200°-230° C. the oil content is too high and the pitch content too low, and the product has a low viscosity and does not dry on the road. On the other hand, if the temperature is raised to 250°-280° C., a product of adequate viscosity is obtained, but the oils have been removed so completely that, again, drying cannot occur.

It will be apparent that it is possible to obtain a road tar with the desired characteristics by mixing these two products.

Hence, distillation is carried out in two stages to produce:

(1) Tar treated to a temperature of 200° C. and deprived of the oils distilling below 170° C., and

(2) A thick tar treated at a temperature of 270° C. and resembling a soft pitch. Further treatment with dry steam is given in the pitch pot. The two products are mixed in 25-ton reservoirs situated on ground level and receiving by gravity the tar leaving the still which is situated at a higher level. The reservoirs are provided with a circulating pump or a mechanical agitator.

The following table shows the characteristics of the tars:

—	Tar from Woodall-Duckham Retorts.				E.P.C. Specification for Road Tar.
	Crude.	A. Treated at 200° C.	B. Treated at 270° C.	C. Road Tar.	
Specific gravity	1·08	1·11	..	1·13	1·16–1·22
Liquor, % by wt.	8	Trace	..	Trace	0–4
Oils to 170° C. ,,	6	0·6	..	0·4	0–1
Oils, 170–270° C. ,,	24	22	0·5	15	12–22
Oils, 270–320° C. ,,	15	14	4·5	12	6–15
Viscosity—					
(E.P.C., at 18° C.), secs.	..	..	..	50	3–100
(Hutchinson, at 25° C.), secs.	..	..	..	[8]	[1–15]
Free carbon, % by wt.	..	..	..	6	5–22
Tar acids, % by vol.	..	..	..	5	0–5
Naphthalene	Trace	..	..	Trace	0–6·5

The approximate proportions in which the two products are to be mixed are first worked out by a simple method of calculation.

Let A be the tar treated to 200° C. and containing a% of oils 170–320° C.
B ,, ,, ,, 270° C. ,, ,, b% ,, ,,
C be the road tar ,, c% ,, ,,

If x and y are the respective proportions by weight in which A and B are to be mixed—

$$\frac{ax}{100} + \frac{by}{100} = \frac{C}{100} \text{ where } x + y = 1.$$

If a calculation is made for the case of tars dealt with in the table, it will be seen that 17 tons of tar A must be mixed with 7 tons of tar B to give 24 tons of road tar C.

It will be understood that the calculation only gives a rough indication of the mixing proportions and that the blending must be checked by analysis.

In practice, at first 180 tons of tar A are prepared and stored, then, without stopping the still, and by mere elevation of the lead temperature and admission of steam to the pitch pot, tar B is made. The 25-ton reservoirs, partially filled with tar A (direct from the still or from stock), receive the required addition of tar B from the still and are alternately being stirred or emptied. By this means, the process is continuous without interruption to the distillation.

When the stock of road tar is sufficient, manufacture of tar A is resumed.

The installation thus works continuously with a shutdown of 24 hours' duration each month to enable the rectifying column to be cleaned and one of 72 hours every two months to enable the still to be cleaned.

The road tar produced meets the requirements of the E.P.C. Specification in all respects save that the specific gravity of 1·13 is 0·03 below the E.P.C. figure. It is, however, almost impossible to reach the value 1·16 due to the composition of continuous vertical retort tar.

Actually, this departure from the specification has not prevented the acceptance of our tar by the Highways Departments, which require an adequate viscosity, absence of liquor, and minimum naphthalene content, and, moreover, in use on the roads, the tar has proved in every way satisfactory. It is, as a fact, possible, as has been shown by M. Guillet, to prepare a re-constituted tar complying with the E.P.C. Specification but giving rise to a streaky effect when the tar is used on the road. This is especially noticeable when tar which has been exposed to too high a temperature has undergone cracking, whereby

the agglutinating power is lost due to liberation of the anthracene oil, which has been recognized as the only oil able to keep the free carbon suspended in the colloidal condition.

SUMMARY.

It will be evident from the foregoing that the Montbéliard plant has proved that it is possible to prepare road tar from pure continuous vertical retort tars and that the T.I.C. process and plant offer the maximum flexibility, simplicity, and safety in the treatment of such tars.

Furthermore, in view of the good results obtained with our road tar, the Department of Bridges and Roads of the Doubs district decided to erect three storage tanks each with a capacity of 200 tons. One of these is at the Montbéliard Works; the other two are 6 and 12 miles distance, and since they are accessible by rail they can be filled by gravity. Since the Montbéliard Works is also equipped so that road tar can be supplied at a temperature of 120° C. either in tar spraying wagons or in tank wagons, it can at any time without difficulty refill the storage tanks.

CONCLUSION.

The results obtained have shown that, as was correctly prophesied by M. Coret, it is advantageous for a works having an annual production of 1000 to 1200 tons of tar to prepare road tar and with the help of its tar plant serve as a central distributing station for the surrounding district.

To retain tar in its supreme position as a road material it is necessary to supply hot tar of good quality, properly treated, and at an attractive price.

The best price will be obtained if the tar is treated where it is produced and if it is not subjected to the costs of transportation to a distant distillery. As far as treatment is concerned, a gas-works is always in a position to supply hot tar ready for application and to prepare bitumen mixtures.

Here again the highways services will find their opportunity and will become customers. As for distillers, no claim for supplanting them is made. On the contrary, there are friendly relations with them, since a works producing 800 tons of road tar per annum has not a sufficient quantity to meet local demands and must have recourse to imported tar. The distiller is available to make good this deficiency and will welcome the opportunity of doing so.

LEGAL INTELLIGENCE

An Ilford Rating Appeal

Gas Light and Coke Company's Assessment

The Gas Light and Coke Company lately appealed to the Rating Appeal Committee of the Essex Quarter Sessions, at Chelmsford, for a reduction of the assessment of part of their undertaking in the Borough of Ilford. Mr. COLLINGWOOD HOPE, K.C., presided.

Mr. J. E. Singleton, K.C., and Mr. Gerald Dodson appeared for the appellants; and Mr. M. Trustram Eve and Mr. P. E. Springman represented the respondents, the South Essex Assessment Committee.

The witnesses appearing for the Company were Mr. J. Southern, of Messrs. Ryde, Sons, & Browne, and Major H. H. Barnes. For the other side the witness was Sir H. Trustram Eve.

Mr. SINGLETON pointed out that when a Court had to consider the assessments of parts of an undertaking such as this it was necessary to consider the whole of the undertaking. The figure appellants were appealing against was £9434, which was the net assessment of that part of their hereditament which was in the Borough of Ilford. Certain figures would be put before the Court which showed that, if the appellants were right, the valuation should be much less. The undertaking of the Gas Light and Coke Company extended into seven counties, and embraced an area extending from Virginia Water to Southend. Generally speaking, throughout the area the basis of assessment was taken at 4% for dead works and 3% in respect of live or productive works. In Ilford the Assessment Committee based their figures on 4½% on dead works and 4% on other works. As a matter of fact, the assessment at Ilford was higher than that at Dagenham, although both were the result of Sir Trustram Eve's survey. At Dagenham Sir Trustram Eve agreed to a figure of 3·6%, and if that was applied to Ilford the assessment would be £8658.

Both the witnesses for the Company submitted valuations which showed that the rateable value of the Gas Light and Coke Company would not allow of an apportionment in the case of Ilford of even the amount already agreed to with the Assessment Committee in that Borough, it being submitted that the existing figure had been arrived at more as a matter of compromise than exact calculation. Further, that the rateable value of the Gas Light and Coke Company was on a much higher basis than that of the other Metropolitan Companies.

Sir *H. Trustram Eve*, for the Borough, submitted that the apportionment as between the tenant and the landlord of any valuation of a Gas Company should be determined not by the method generally adopted in such matters, but upon a basis of more or less equal division, thus introducing a new theory in regard to the question of rating.

Mr. M. TRUSTRAM EVE said that the gross receipts of the undertaking in Ilford in 1928 were £198,672, the accepted (not agreed) assessment on that figure working out at something like 4%. The gross receipts in 1930 had increased to £230,965, and all the respondents asked was that the percentage accepted in 1928 should be applied to the new figure. When the valuation was made in 1928 they had come to the conclusion that the proper rate for productive or live works was a net 5% on the gross receipts. With regard to the value of dead works there was no dispute. The Company objected to 5%, but eventually there was a compromise on a lower percentage. He considered this figure too low, but on the other hand Mr. Southern, who appeared for the Company, thought it was too high. If the gross receipts in Ilford at the time of the acceptance of the figure arrived at had been £213,000 as in 1930, it was probable that the Company would have accepted the figure of £9583, and this would have appeared in the valuation list.

The appeal was allowed, the assessment being reduced to £9100, no order being made as to costs.

Pressure Control of Retorts.

Extension of Patent.

In the Chancery Division, on Wednesday (Dec. 7), Mr. Justice Luxmoore dealt with an application for an extension of letters patent for a method for equalizing or maintaining the equilibrium or any predetermined condition of pressure in retorts and offtake pipes in the manufacture of coal gas. Those letters patent had been granted to Mr. Archibald Alexander Mackintosh and Mr. Wm. Henry Hunt, and the applicants were A. A. Mackintosh, of Victoria, Australia, the Mackintosh Auto-Control Gasification Company Proprietary, of Melbourne, and the widow of Mr. W. H. Hunt.

Appearing for the applicants, Mr. Kenneth Swan explained that the Company had taken an assignment of the patent, which was granted in 1916. It involved a considerable amount of apparatus, and was for the purpose of maintaining a constant pressure of gas from gas retorts in the process of distillation of coal. The patentees had the patent extended in Australia for four years.

In the past there had been an amount of difficulty in maintaining equal pressure without reducing the calorific value of the gas. Obviously it had been impossible to develop such an invention under war conditions. It would involve considerable expenditure and the scrapping of existing plant. It was not until 1920, or the following year, that the patentees first got paying installations, and since then their invention had been installed in 27 gas-works in Australia and New Zealand. They had also made attempts, so far without success, to develop it in England. Counsel submitted that a clear case had been made out for an extension of the patent.

Mr. Stafford Crossman stated that an extension of 18 months had been suggested by the Comptroller of Patents as a reasonable one. However, he would not oppose 2½ years if his Lordship thought that to be a fair period.

In the end, an extension of 2½ years was granted by Mr. Justice Luxmoore.

SELLING THE STORAGE WATER HEATER

Remarkably Fine Effort by the Croydon Gas Company

THE KATHERINE STREET SHOWROOMS OF THE CROYDON GAS COMPANY DURING "K.C.U. WEEK."

An excellent display has been attracting large numbers of consumers to the Katherine Street Showrooms of the Croydon Gas Company. After a good deal of preparation by the Company, Croydon's " K.C.U. Week " was arranged, and from Monday, Nov. 28, till the following Saturday the showrooms and windows were given up to a series of displays all featuring the " K.C.U. " water heater. The entire scheme was carried out in contrasting shades of blue relieved with white and gold, and all literature, window bills, &c., were prepared to harmonize with the general colour scheme. In the vestibule a large centre-piece was erected consisting of a three-fold screen, on the centre panel of which was an arresting design embodying a number of " K.C.U." heaters and surmounted by a large cut-out representation of an air liner, to link up with the slogan " Hot Water at Speed." On the side panels, a wash-basin and a kitchen sink were fitted, with a " K.C.U." over each to demonstrate the high efficiency of this water heater.

THE VESTIBULE DISPLAY.

This is CROYDON'S K.C.U. WEEK!
The "K.C.U." WATER HEATER
This is CROYDON'S K.C.U. WEEK!
This is CROYDON'S K.C.U. WEEK!
Installing the "K.C.U." at Mrs Johnson's
This is CROYDON'S K.C.U. WEEK!

Some of the Publicity Matter used in Croydon's " K.C.U. Week," including folders, photo postcards, and gummed labels.

A little novelty in the form of a small table for printed literature, made up of the letters " K.C.U.," stood near the centre display, and large cut-out arrows, in blue and white, bearing the words " This is Croydon's K.C.U. Week " were placed in various parts of the showrooms, all pointing to the main vestibule display. The windows were fitted with specially designed pelmets and a series of window displays featuring the figure of the well-known " K.C.U." fitter and linked up with the slogan " Hot Water at Speed " attracted a good deal of attention. Sixteen-sheet and double-crown posters bearing the words " This is Croydon's K.C.U. Week " were placed inside and outside the showrooms. The display was advertised in the local papers, and also by means of a small poster stamp on the Gas Company's receipted accounts; and numerous people were attracted to the showrooms to see this fine show. Every credit should be given to the Croydon Gas Company for their enterprise in staging " Croydon's K.C.U. Week."

INSTITUTION OF GAS ENGINEERS

Written Contributions and Authors' Replies to Discussions at the Autumn Research Meeting

(*Concluded from p. 694.*)

The Sigma B.Th.U. Recorder

30th Report of the Joint Research Committee

Mr. Wood's Reply.

Mr. JAMES W. WOOD, in reply to the discussion, writes:

It is very useful to have **Mr. Blackie's** interesting contribution and to hear that our experiences with the Sigma Recorder are substantially in accord with those at the Fuel Research Station. In view of the curves given upon page 62 of the Report it would be interesting to have had temperature and pressure data corresponding with the specific gravity compensation tests quoted by Mr. Blackie, especially as only 1 per cent. of the 3 per cent. deviation of recorded calorific value from the Boys' value is accounted for by change in gas rate. The same curves shew that as regards compensation for temperature and pressure the gas rate may go up or down according to the specific gravity of the gas used; it would therefore have been helpful if Mr. Blackie had indicated the nature of the gas upon which his conclusions were based. The data upon subjecting the Recorder only to certain thermal changes are very interesting. As indicated upon page 80, however, attempts had been made to cover the points suggested by Mr. Blackie, using alternative methods, but without success. The advisability of securing a situation for the Recorder free from draughts is strongly emphasized both by Mr. Blackie and by Dr. Stewart.

The remarks of **Dr. Stewart** with respect to manipulative details, the relative merits of diaphragm and bell governors, and modifications of the Sigma Recorder with a view to improving its performance will be greatly appreciated by those who have the care of such instruments in their hands. In reply to my question as to whether re-distribution of the governor pressures was not elimination, but only a matter of transferring wire-drawing to another point in the circuit, Dr. Stewart replied, "The change was simply in the initial governor where the pressure is $2\frac{1}{2}$ in.; and to reduce that to 1 in., if it gets fouled, does not matter very much. In the second governor the pressure drop is from $2\frac{1}{2}$ in. to $\frac{3}{8}$ in., but that, of course, is a different matter." The point as to whether a recorder should necessarily take the form of a standard calorimeter is one which I have discussed before with Dr. Stewart, and to a great extent I am in agreement with his views. You would not get a really first-class Recorder merely by attaching some recording device to a standard calorimeter. The general impression of the Sigma Recorder is that of a very simple and compact instrument. If, however, you take the whole instrument, including facilities for checking, the difference in complexity as compared with other instruments is not so great as would appear at first sight.

Mr. Butterfield has already related valuable experiences with recording calorimeters in the Paper he read in Birmingham upon the subject of Recording Calorimetry. There is, of course, always risk in carrying out extensive research with an individual instrument. The information which has been given with respect to other instruments in different parts of the country is therefore of special value, and it is interesting to hear that the instrument examined is, perhaps, a trifle above the average in performance. The fact that the gas at Leeds is of very uniform quality was helpful in examining what might be called the erratic behaviour of the recorder. The response of the recorder to quite considerable changes in calorific value was, however, also studied by supplying it with gas mixtures specially prepared for that purpose.

The point raised by **Mr. Howarth** concerning the lack of symmetry in the curve for equal changes in calorific value when rising and falling values are in question has been investigated, but the time-scale of the instrument is too small to express any opinion as to lack of symmetry, which upon theoretical grounds might be expected to exist. It would be preferable to examine this point anew with an instrument provided with a more open time-scale. There is, unfortunately, no reliable method of checking a recording calorimeter when working upon a gas of rapidly varying quality, and switching over to the finished Town's gas supply or working from a small holder seem to be the only practicable methods for checking. Deviations in the recorded calorific value due to changes in atmospheric humidity would in general be so small as to be difficult to detect, but differences accompanying changes in humidity of the gas are easily observable. It is rather surprising that Mr. Howarth finds it unnecessary to clean his governors frequently, as most of the trouble with the instrument under examination, and with others reported to us has been due to fouling of the governor valves.

In conclusion I should like to mention one matter which relates to the principles which should underlie the testing of a recording calorimeter. I have received communications from Gas Engineers and have been told that their instruments are never in error by more than 1 per cent.; but there is a very good reason for this, for if the error exceeds 1 per cent. the instrument is regarded as incorrect and is readjusted. That, however, is not a fair way of assessing an instrument which may have to run unattended for a month at a time, although the same objection does not hold for an instrument used only for works control purposes and kept under continuous supervision. The point made by Mr. Blackie, that he has found the errors largely to effect mutual compensation, is, I would venture to suggest, rather unsound, and may break down at certain times of the year when unfavourable combinations of temperature and pressure occur.

Intermittent Vertical Chambers at Croydon

32nd Report of the Joint Research Committee

Mr. L. H. Sensicle.

Mr. L. H. SENSICLE writes:

The Authors are to be congratulated on the exhaustive nature of the test, and the care and ingenuity displayed in obtaining the very full record of operating data. In particular, the development of the suction pyrometer for the accurate measurement of hot gas temperatures in parts of the plant where the adjacent brickwork is at a different temperature, and would normally introduce errors due to radiation effects, should prove especially valuable to operators who have been faced with this difficulty.

The test results are of special interest in that they embody results obtained mainly with first class Durham coals, presumably of the "Wear Specials" variety, which are known to be among the best gas coals in the country. Hitherto most of tests on vertical chambers published in this country have been on second, or medium class Durham, or on Yorkshire coals. As far as I am aware, the only exception was a test on Londonderry coal reported by N. J. Bowater in 1927 in a Paper before the Institute of Fuel, the same Paper being also presented at the Birmingham Carbonization Conference in February, 1928. The results obtained on this coal, with a content of 9·38 per cent. ash and moisture, were definitely good and embodied a yield of 83·2 therms of 537 C.V. gas. The figures excited comment at the time, but were, in fact, not surprising in view of the class of coal used. The excellent results obtained, even with medium class Durham coal, since that time have fully confirmed expectations, and the present independent Report of the Joint Research Committee should put the potentialities of intermittent vertical chambers beyond any possibility of doubt.

Vertical chambers have many points of difference from carbonizing systems in general use until quite recently, and it is clear that much interesting work can still be done in elucidating the precise course of the carbonization and steaming processes in the chambers. The curves of bottom offtake temperatures on page 23 are a useful example of what can be done. In this connection I should like to ask for more particulars regarding the "Coals A, B, C, and D," which are there referred to without further qualification. Of these coals, B and D appear to behave like the generality of Durham coals in shewing an increase of gas pressure at the base of the chamber towards the end of carbonization which has been attributed to the meeting of the plastic layers in the middle of the charge, and to the receipt of heat by the single layer thus formed from both walls simultaneously. A and C do not appear to have given indication of this effect, but it is to be noted that in the type of plant under consideration the pressure at the bottom of the chamber must of necessity exceed 1½ in. W.G. before any flow of gas through the lower offtake can occur. In contrast with this, the type of chamber with which I am more familiar has bottom gas offtakes which are completely unsealed during the carbonization stage.

The reference to a special advantage of continuous verticals in the introduction, namely, that steaming effects partial quenching of the coke and returns heat to the system, whereas the coke from vertical chambers is discharged at high temperature, is of considerable importance, and points the moral that coke dry cooling should be adopted as common practice at the latter, thus rendering intermittent vertical chambers thermally more efficient than continuous vertical retorts, whatever the extent of steaming. In conclusion it should be said that the Report should prove a valuable source of information for some time to come.

Mr. R. W. Crowther.

Mr. R. W. CROWTHER writes:

The references made, on page 24 of the 32nd Report, to leakages from vertical chamber ovens further supports the contention that the minimization of thermal leakages depends to a large extent on the reduction of pressure in the lower part of the chambers during the early stages of carbonization. The curves shewn in Figure 1 compare closely with similar records obtained from a plant of the Klonne type, in particular the curve shewn for Coal C. Such curves prove conclusively that considerable evolution of gas takes place from the lower gas offtakes of intermittent vertical chambers, and serve to emphasize the importance of fitting such ovens with efficient lower gas offtakes. Reference is made in the Report (page 24) that greater pressures are likely to develop than the seal provided. I should like to ask, if figures are available shewing the actual pressures set up in the lower gas offtakes? Further, it would be interesting to know the thermal leakage from the chambers relative to the different pressures developed with the various classes of coal used during the test. I should like to ask too if any observations were made of the pressure developed in the lower part of the chamber with less depth of charge and consequently less resistance to the free exit of the gas in a vertical direction?

Mr. H. J. Toogood.

Mr. H. J. TOOGOOD writes:

When reading the Report, one is immediately intrigued that these intermittent verticals are steadfastly termed chambers. The introduction to the Report defines that these chambers: (1) Resemble continuous vertical retorts, in that the coal completely fills their cross-section. (2) Resemble horizontal retorts in that the coke is discharged hot. Hence, the inference (or the impression is created) that these particular chambers should not be confused (nor compared) with the erstwhile intermittent vertical retorts.

Believing such a comparison to be absolutely necessary to a full and proper appreciation of the technics involved, and having taken an active part in pioneering, in this country, a system of intermittent vertical retorts, I submit comparative data.

As a principle, vertical retort carbonization has been an ideal of carbonizers throughout living memory, so much so, that intermittent vertical retort carbonization was introduced on a practical scale in 1908. At this period the fetish of the candle-power standard still prevailed, and these were also the days of isolated or independent effort (the period of organized research having not then dawned), so that in all probability this 32nd Report will be better known to posterity in 1956—24 years hence, than we know the history of 24 years since—1908.

Comparing the intermittent verticals (retorts v. chambers) the size of the unit commenced with 1 retort-charge of 8½ cwt. and grew to 3 grouped retort-charges totalling 35 cwt., which is approximately half the size of to-day's unit.

The retorts were manufactured of fireclay or siliceous refractory materials, the date being before the advent of the practice of silica retort construction.

The thickness of the charge was 14 in. at the bottom, as compared with 12½ in. to-day. The height of the charge was 13 ft. 6 in. to 16 ft. 6 in. as compared with 21 ft. 0 in. to-day.

A breeze-pad was used to prevent the coal getting below the zone of the carbonizing heat of the retort, it being believed that the breeze would absorb the tar and form saleable coke with added economy. Extended experience shewed that the tar ascended as vapour (as in the present-day continuous vertical retorts), and as the breeze was often buried in the coke stack in the yard and difficult to get, graded-small-coke was used. Later mechanical stops were tried, but finally the practice settled generally to a pad of small-coke.

The 12 hour charges were steamed for the last 2 hours, but owing to the incidence of our candle-power standard, and to the existence of carburetted water gas plants, the scope for steaming was very limited.

Gas pressure at the bottom mouthpiece was experienced and the maximum Sperm Value being the desiderata, special means were adopted to reduce internal gas-pressure.

When charging, the coal was fed in a thin stream, thus utilizing the natural phenomenon of segregation of nuts from slack, to form a charge having a porous passage, which by carbonizing at a slightly accelerated rate (relatively to the body of the charge) maintained a gas-passage up through the charge, and thereby established continuous low pressure conditions. Visualizing the charge in an intermittent vertical retort it was deduced that as gas, tar, and water-vapour, rising through the charge must find exit from the very limited surface-area of the coal-charge which comprised the cap of the charge, the physical condition of this cap was of considerable importance to the establishment and maintenance of the desired low-pressure condition throughout the charge, at all times.

As to scurf it was clear that a ½ in. thickness of carbon altered the coal-capacity of the retort by 10 per cent. Therefore, if retorts were not to be charged too full for the desired low pressure conditions, considerable watchfulness during stoking was demanded, unless some automatic means were available. The problem was solved by a

special charging-shoot which entered the retort some considerable distance, and automatically cut off the flow of coal exactly when the retort was filled to the predetermined level.

Thus was this vital cap of the charge definitely controlled to exactitude, and this quite regardless of the ever fluctuating physical conditions of either the coal or the retort as to scurf. The pressure conditions were such that 7-10ths water-gauge at the bottom mouthpiece prevailed over a short portion of the carbonizing period, but even this was considered detrimental and capable of improvement.

The bottom mouthpieces were fitted with gas off-takes, which were in communication with the main gas-outlets from the top mouthpieces. Each pair of bottom mouthpieces were connected together by communicating gasways, the pair of retorts so connected being in widely different stages of distillation, and by sealing the respective off-takes, the spent charge of coke was steamed downwardly, and the water-gas thus formed was delivered (with the sensible heat gathered from the coke) into the bottom of the neighbouring coal-charge.

(En passant it is interesting to note that the advantage of downward steaming finds justification to-day in the 31st Report.)

Lastly, in order to reduce the dust and flame when charging, one installation was fitted so that the coal entered the sealed retort via a valved communication, whence no flame nor smoke was emitted, and no minor explosions occurred, but unfortunately consideration of first-cost, prevented the development of this cleanly method.

Considering this brief comparison it is suggested that the high thermal efficiency of these chambers is due primarily, if not wholly, to the higher temperature of the charge, which in turn is due to the modern silica construction, and to the increased time-contact of steaming, due to the increased heights of the chambers (the 10 ft. 0 in. width which gives the name of chamber being dormant in this respect) supplemented of course by the modern developments in insulation, increased gas-tightness of silica retorts, larger units and the addition of the waste-heat boiler, and last, but not least, the modern steaming to the thermal standard.

The Report refers to variation in the decomposition of steam, due to variations in the physical conditions of the charge. It is suggested that this detrimental variation would be minimized by the adoption of the special charging shoot or/and the downward steaming, as described.

(See "GAS JOURNAL," 2nd November, 1932, page 320, where continental coke ovens connected and steamed as described above have raised the efficiency of steam decomposition from 75 per cent. to 90 per cent.)

To illustrate clearly what is involved by downward steaming of intermittent verticals, it must first be realized that the column of red hot coke has not been blown with air to complete incandescence, as is the coke, within a water gas plant.

Instead, the column of coke contains a core of dull red-hot *coal* under rapid distillation and vielding up its volatiles so that this core is quite useless for water gas formation, and it should be noted that the percentage of volatiles is greatest towards the top of the retort. The annulus of coke and scurf which together are useful for water gas formation are likewise at various and relatively low temperatures for economic water gas formation.

These temperatures will be approximately proportionate to the adjacent flue temperature. Allowing 150° C. for drop across the retort walls, then the temperature of the annular column of coke is:

1300 − 150 = 1150° C. at the bottom.
875 − 150 = 725° C. at the top.

If it is agreed that 725° C. is too low for efficient water gas production, it cannot be denied that 725° C. is eminently suitable for the superheating of the steam preparatory to efficient and rapid water gas production in the very limited zone at 1150° C. at the bottom of the retort.

Hence downward steaming would appear to offer immediately an increase in steaming efficiency, and I suggest that this factor could with profit be investigated by the Research Committee in conjunction with the 32nd Report.

On page 24 of the Report it is stated that in spite of the regulation of the retort house governor, the pressure at the bottom of the chambers for a considerable portion of the carbonizing period was greater than the 1½ in. seal. As no such seal was used with intermittent vertical retorts, I should like to inquire its purpose with these chambers?

In conclusion the ideal before every carbonizer is *Gas into Holder at 0·0 pence per Therm*, and though high thermal efficiencies such as set forth in this Report are undoubtedly the chief factor, there yet remains much to be done (particularly in the average-sized and inland Gas Works) in the remaining factors of capital and maintenance costs, coal purchase and residual sales, before this ideal is approached.

Meantime, the problem of carbonization bristles with opportunities, such as the ever growing supply of cleaned coal and slacks, the development of the domestic graded coke-sales due to low ash and moisture content, the tariff-encouraged benzol extraction and its economic bearing on season's fluctuations of therms required, increased coal-throughputs per unit volume of brickwork, dry-quenching, heat recovery and heat conservation, and the death of the ascension pipe, so much so, that the young carbonizer (considering many of our smaller Gas Works, where one type of carbonizing plant only is permissible, and consequently one medium-hard coke must satisfy the demand of all customers' varying requirements) may well reflect on this many-sided problem and inquire introspectively for some light on the solving of his riddle of the Sphinx "The Choice of Type of Carbonizing Plant."

In fine, Is History repeating itself? And just as the invisible or sub-conscious economic forces gave rise to intermittent vertical retorts and thus paved the way from horizontal to continuous verticals, so may the intermittent chambers of to-day be destined in like manner to silently provide for many Works, a way-back from continuous verticals to some form of glorified horizontal practice.

Dr. Dent's Reply.

Dr. F. J. DENT writes:

I should like first of all to thank the meeting for the way in which the Report was received. The Discussion which followed it brought forth many interesting points; I will endeavour to reply to those which have a direct bearing on the test. I may say at the outset, however, that the only measurements we made were with the plant working under the conditions described in the Report. These conditions were not varied in any way during our stay at Croydon, and as stated previously and also emphasized by **Mr. Grogono**, the test is to be regarded as an observation of a four weeks' period in the plant's everyday life. I am in full agreement with Mr. Grogono's other remarks which call for no further comment.

Mr. Richards draws attention to the use of the phrase "heat passed through the chamber walls" at the bottom of page 18. The phrase refers to item (C) in the heat balance given on the same page, and includes, as I gather Mr. Richard supposes, the heat lost by radiation, convection, &c., from the setting.

I do not think that there is any need for me to point out that the design of the special thermocouple is based on a well-known principle, but I was pleased to hear Mr. Richards say that the description of its simple construction will be of use.

Mr. Carmichael asks for the details of chamber design which was called for by the carbonization of Durham coals. Apart from the choice of a suitable taper on the oven, I think I am correct in stating that for the satisfactory carbonization of Durham coals, it was found essential to provide a gas offtake at the bottom of the chamber, and, in the operation of the plant, to choose the optimum seal for the bottom offtake. Too small a seal leads to a loss of gaseous therms as light tar, the vapours of which escape without undergoing adequate decomposition, while with too deep a seal, excessive pressures may develop inside the chamber.

With reference to the use of graded coke for the pad resting on the lower door, I may say that it was found that breeze was not suitable for this purpose since the gas passage through it became blocked with tar which distilled from the oven charge. The use of graded coke cannot however be regarded as "distinctly uneconomical" since the coke is not destroyed in the plant, and, when the cementing action of the tar mentioned previously is taken into account, the net amount of breakage which the coke-pad undergoes, is small.

The phrase "the whole of the chamber is heated to carbonizing temperatures" was included in the comparison of intermittent ovens with continuous vertical retorts. It indicates that the temperature at any part of the chamber was adequate for the carbonization of the coal in that region. The process did not depend on the movement of the coal into a hotter zone for its completion.

The volatile matter in the coke was determined by heating samples to 900° C. in an atmosphere of nitrogen. The figure obtained, viz., 1·3 per cent., represents an average for all the coke from the oven, both top and bottom.

During the tests we made no measurements of the moisture in the coke leaving the works. 8·0 per cent. of moisture can, however, be taken as typical of the works routine tests.

The reactivity of the coke towards carbon dioxide has been determined since the Report was written and a figure

of 0·40* was obtained. It is interesting to note that this reactivity is 70 per cent. greater than those of the cokes used in the water gas tests in the 31st Report. The cokes in the later tests were prepared in steamed continuous vertical retorts from Durham coal in all cases except one, in which Yorkshire coal was used.

The temperatures of the combustion flues were measured with a standardized Foster disappearing filament pyrometer which was sighted on the region at the damper tiles.

I do not agree with Mr. Carmichael's implication when, in speaking of the Connersville meter, he refers to the "more accurate station meter." I know of no evidence on which to base such an opinion; the difficulty of calibrating a wet meter does not require emphasis here. The construction of the Connersville meter makes it almost completely positive, the sole uncertainty attaching to a small amount of slip which occurs between the rotors and the outer case. Under normal conditions of working, the slip does not exceed 0·5 per cent., and the counter on the meter is geared in such a way as to allow for it. Thus at Croydon the counter was set so as to read correctly for a slip of 0·36 per cent., and was incorrect, as the actual slip deviated from that figure. It is important to realize that under no conditions was it possible for the meter to read more than 0·36 per cent. fast and, as the actual slip increased above that figure, its indications would be too low. During the test the differential pressure across the meter averaged 0·15 in. water gauge and a calibration made immediately after the tests shewed that the slip at this differential was 0·05 per cent. Hence, the counter was reading 0·31 per cent. fast.

The 2·0 B.Th.U.'s correction to the calorific value of the coal gas was determined by two methods, (*a*) by observing the decrease in the calorific value of gas standing in the test holders and (*b*) by checking holder samples against spot tests made at 15 minute intervals over a corresponding period.

Mr. Carmichael thinks our method of determining the weight of the coke made was unsatisfactory. Before discussing the method I would point out to him that this Report, in common with all the Committee's other Reports on large scale tests, includes chemical balances. One of the main reasons why such balances are inserted is to enable the reader to check the accuracy of the methods used. In the present instance two balances come into consideration. They are given on pages 58 and 59, the Carbon Balance and Ash Balance, respectively. The Carbon Balance gives a check on the *weight* of the coke—and I may point out that it is a severe check, in view of the coke accounting for approximately 80 per cent. of the total carbon supplied—while the ash balance gives a good indication as to whether or not the *quality* of the samples has been representative. It follows from both these balances that the errors in weighing and sampling have not been greater than the errors of analysis, and it can be taken that the figure for the weight of coke made per ton of coal carbonized is accurate to within 1 per cent. The reason why the method of coke measurement used was so completely satisfactory rests in the small variation in the weight of the individual coke discharges.

The hot liquor sprayed into the gas offtakes and mains was supplied at a temperature of 65° C. and a pressure of 45 lbs. per square inch, to nozzles (one per gas offtake) of 13-64 in. bore.

Mr. Carmichael asks for the reason why apparatus (*i.e.*, the waste heat boiler) was installed to recover the 5·5 therms from the waste gases whereas the 9·5 therms of sensible heat in the coke was neglected. The question is largely an engineering and economic one, but I should like to point out that the two figures quoted by Mr. Carmichael are not of the same nature. The 5·5 therms represents heat actually recovered, whereas the figure of 9·5 therms represents the total sensible heat in the red hot coke. The amount of heat recoverable from the coke will be less than this figure, depending upon the efficiency of the appliance used to recover it. The figure more truly comparable with the total sensible heat in the coke is that representing the total heat of the waste gases entering the boiler. The latter figure equals the sum of items (*a*) and (*b*) in Table IX. on page 18 of the Report, namely, 14·26 therms (the reason for the low efficiency of the boiler are given in the Report). In this connection it should be emphasized that the figure for the sensible heat in the coke as discharged from the chambers was not determined by direct measurement; it was calculated on the assumption that the coke left the chambers at 900° C.

Mr. Thorman refers to the connection between the increase in the temperature of the combustion flues and the increase in gaseous therms. It does undoubtedly appear that the higher temperatures are responsible for the increase in the thermal yield. This is borne out by the behaviour of the plant, since it was first put to work and by the reduction in the volatile matter of the coke.

We made no experiments in which steam was admitted to the chambers before the tenth hour of carbonization. The only observation we did note in that connection is given in the Report where it is shewn that when steam was admitted before carbonization was complete the percentage of steam decomposed was low.

By calculation I find that the 78·6 therms of gas obtained per ton of coal are composed of 72·3 therms of coal gas with a calorific value of 592 B.Th.U. per cu.ft. and 6·3 therms of water gas with a calorific value of 301 B.Th.U. per cu.ft.

The estimation of the benzole in the tar samples has not yet been made, and no determinations were made of the amount of benzole which could be scrubbed from the gas. Since the test a benzole washing plant has been installed in the gas stream, and a note on its performance may be published later.

Mr. Lymn refers to the loss of heat in the hot coke discharged from the chambers and indicates that the Report, in stating that this loss of heat is avoided in continuous vertical retorts, does not present a true picture in suggesting that considerably higher producer efficiencies can be expected in the latter type of installation. It is, however, pointed out in the Report that the influence of the additional loss of heat in the hot coke in the case of the intermittent plant tested, was counteracted by the extensive recuperation of heat from the waste gases.

I note with interest Mr. Lymn's statement that more than 9 therms can be recovered by means of the dry-cooling of the coke.

Mr. Lymn also advances suggestions for further investigation on inside and outside producers which will, no doubt, receive the consideration of the committee.

I think **Dr. Pexton**'s contribution is a very valuable one. He is in agreement with the findings of the Report in which the conclusion is reached that the leakage of hydrogen from the chambers, and hence the loss of coal gas, can be determined with considerably greater accuracy than the leakage of carbon. He also describes a comparatively simple method for the determination of the hydrogen leakage, a method which I am sure will find wide application.

I was interested in Dr. Pexton's remarks on the loss of hydrogen by diffusion. Any loss of hydrogen by this process is included in the hydrogen leakage as measured in the Report, but, if diffusion took place to any considerable extent, the computation of the loss of coal gas therms from the hydrogen leakage would be affected. I note, however, that the results of preliminary experiments indicate that the amount of hydrogen diffusion is small compared with the normal leakage of hydrogen met with in practice.

Since the Report has been in print an arithmetical error has unfortunately been found in the derivation of the specific heat of the waste gas from its analysis. The correction makes itself felt throughout the calculation of the leakages, and I will not attempt to give here a complete list of the revised figures. The figures will be corrected before the Report is included in the Transactions to which reference should be made. It can be stated however that the corrections are not extensive and do not interfere with the conclusion that the leakages were small and explain the very satisfactory yield of coal gas collected; the figure given for the loss of coal gas from the chambers, viz., 1·6 therms per ton of coal, now becomes 1·8 therms.

I should mention that the detection of the error arose out of a query by Dr. Pexton, and I should like to thank him for his help. I may also add that our calculations of the leakages are now in complete agreement with the table given by Dr. Pexton showing the relationship between the loss of coal gas and the composition of the waste gas.

Mr. Lymn and **Mr. Sensicle** refer to the test on a C.O.L. plant described by N. J. Bowater to the Institute of Fuel in 1927, and comparison of the results with the figures given in the Report are interesting. A discussion of such a comparison is purposely avoided in view of the possible variations in the coals used and of the absence of data which would lead to explanations of any differences observed between the figures.

At this stage I am unable to give Mr. Sensicle any further data relative to the coals referred to as "A, B, C, and D," on page 23 of the Report. I agree that the different behaviours of the coals are worthy of further investigation.

Mr. Crowther refers to the functions of the bottom offtakes, and I note that his observations are in agreement with those shewn in Figure 1. By the statement in the Report that "the pressures at the base of the chamber can be greater than that thrown by the seal," is meant that the pressure in the chamber may be sufficient to overcome the seal; no direct observations of the pressures

* This figure is expressed on the Key-Cobb scale. *Vide* J.S.C.I. 439T, 444T; 49; 1930. The measurements have been kindly made for us by Professor Cobb in his laboratories.

were made and neither did the measurements of leakage enable the different coals to be differentiated in this respect.

Mr. Toogood's discussion of the relative positions of the intermittent chamber and retort, and the data he gives, forms a useful addition to the Report. After what has gone before there remains little in his remarks which calls for further comment. There appears to be some advantage in steaming the chambers in a downward direction, especially if the amount of steam used is high. I can refer Mr. Carmichael to Mr. Toogood's experience with breeze pads.

Refractory Materials

23rd Report of the Joint Sub-Committee

Mr. R. H. B. Lamprey.

Mr. R. H. B. LAMPREY writes:

The Authors are to be congratulated on the progress already made on this difficult subject, particularly with regard to the general survey of the conditions under which these repairs have to be made to both vertical and horizontal retorts.

It would seem, however, that since the conditions differ so greatly between verticals and horizontals and also between silica and siliceous types of retort, the subject might have been better approached under separate headings, thus:

(1) Silica retorts, which would have included verticals and horizontals, and
(2) Siliceous retorts, which would have dealt almost exclusively with horizontals.

The composition of a hot patching material suitable for siliceous retorts differs considerably from that required for silica retorts, indeed many instances have been reported in which silica retorts have been damaged by the application of proprietary hot patching materials compounded presumably for use with siliceous retorts only.

A survey of the materials commonly used for hot patching purposes would have been useful and a report on their behaviour in use would be a valuable contribution to the subject.

The need for the property of "stickability" such as would be produced by the use of organic substances seems to be over-emphasized. Although it is, of course, essential that the applied mass should have good spreading properties and be capable of being pressed into cracks and small holes in a red hot retort, it is questionable whether this property is enhanced by the use of such substances as sulphite lye, glycerine, or pitch. An examination of the suddenly heated mass when carried out in a test furnace such as described by the Authors, shews that the use of organic adhesives tends to produce a more friable texture than would otherwise be obtained. Similarly, mixtures rich in clay although much preferred by the operatives for use with siliceous retorts (but dangerous for use with silica), when tested under the above conditions are found to produce a powdery mass, which has no adhesive or hardening properties. It is not generally recognized that the grinding of silica and clay, so commonly practised, although reducing the tendency to shrinkage, lowers the softening point of the mixture and under some conditions, especially when silicate of soda is added, may produce a mass which fuses at the external working temperature of the retort.

The Authors state that the application of wet patching mixtures sets up local strains and causes damage to the retort, particularly in silica retorts. Have they any evidence in support of this statement?

It would seem that the Authors, on the assumption that wet patching is harmful, have concentrated on alternative means of applying patches. It is, of course, true that definite adhesion between two refractory surfaces can be obtained only by the use of a fluxing body in the applied mass, or by raising the temperature of the two surfaces.

Satisfactory welding has been carried out by means of oxy-coal gas in a similar manner to that described by the Authors, on small pieces of retort, but when translated to the full scale conditions, the apparatus with its water, gas, and compressed air connections was found to be much too cumbersome. A similar type of apparatus used for forcing a thick suspension of hot patching materials into cracks, with its water and compressed air services, was found to be unwieldy and only suitable for conditions when the retort had been scurfed and left empty. There would appear to be more likelihood of damage to retorts by overheating when using applied heat than would occur from the cooling effect of wet patching materials.

A hot patching material or any type of apparatus used for its application must be capable of doing its work very rapidly, since the majority of small holes and cracks have to be filled in within a few minutes of the retort being discharged; it is only when the retort is left out for scurfing that any appreciable time can be devoted to patching. Again a hole of appreciable size cannot be dealt with by a building up process such as dry spraying or by use of a cement gun unless a backing of some sort is provided, and it is the absence of external support in most cases that prevents a satisfactory repair being made. Adhesion between applied masses of wet or dry material, even in the presence of superficial fluxing bodies, is rendered difficult by the presence of a film of carbon on the retort surface (and penetrating some distance into its thickness), even after the retort has been scurfed.

Quite apart from the composition of the material used for patching, the repair of retorts while at work requires great skill and therefore should, so far as possible, be confined to men trained in this work and not left, as is sometimes done, to the machine attendants or other retort house men.

It is hoped that the question of hot patching with wet mixtures will not be lost sight of in further work on this subject, because for horizontal retorts the application by means of long iron bars of such materials is a simple and rapid method, which could hardly be improved upon. In addition to filling small holes and cracks the resurfacing of abraded ends is also an important function of hot work and one to which a hot patching wet mixture should also be applicable. Also it should be borne in mind that a suitable hot patching material used in the wet state would be equally satisfactory for cold repair work and therefore research into the adhesion and hardening of various refractory mixtures would be valuable from both aspects of retort repairs.

Mr. Green's Reply.

Mr. A. T. GREEN writes:

In the first place, I wish to thank the meeting for the very favourable reception of the Report, and the speakers who have entered into the discussion for their interesting suggestions and for the details of their valuable experiences.

Mr. F. West has introduced a number of important points requiring very careful consideration. The swelling of coals—particularly including certain Durham coals—in relation to the troubles in a vertical retort is a subject for continued investigation. This swelling can subject the retort to great stresses at a distance of six to ten feet from the top. These stresses can affect the alignment of the retort surface, and might cause the actual failure of the retort brickwork. Besides this, there is probably a connection between the flaking of the retort surface and the swelling of the coal. The accepted internal contour of a particular type retort is, obviously, the outcome of a knowledge of the average behaviour of coals in this installation. It seems that swelling coals demand special consideration in the design of the retort, if the bad effects of swelling are to be mitigated. The expansion stresses in retorts do not appear to have received adequate definition, at least, from the standpoint of the Gas Engineer. The examination of "cold" retorts, often, indicates that such stresses have existed. In previous investigations I have shewn that some of the stresses, at least, are the result of the peculiar conditions existing in particular settings, and are not common to all similar installations. Probably, the disposition of temperature necessary for the adequate carbonization of certain coals influences the locality and effect of these expansion stresses.

In connection with **Mr. Carpenter's** contribution, it would be interesting to know the constitution of his cements, and also to examine the retorts, when they are "put off" either for cold patching or dismantling.

I agree with **Mr. Firth** that wet spraying methods should be used with greatest caution, particularly with silica settings. The fact that the staff of the Leeds Gas Works were able to use the gas permeability data in a definition of gas leakage from their retorts is an interesting commentary on the early appreciation of this work by the industry.

Mr. Allen has dealt with the Report from the standpoint of a manufacturer of silica products. I should like to say

that investigations concerning the relationship of texture to permeability, whose object is to evolve silica products of low permeability, are in progress. Respecting the temperature at which the hot-patching work has been completed, temperatures from 900°-1350° have been used. Unfortunately, all the results could not be included in this Report, which gives the summary of the main indications.

I am particularly grateful to **Mr. Rhead** for the ideas on hot-patching which he has put forward. Some of them represent lines along which we have been working. It is pleasing to note Mr. Rhead's emphasis on the value of the permeability data to the understanding of the deterioration of refractory materials by the inter-penetration of vapours into the brickwork.

Mr. Lamprey has written a very valuable contribution to the discussion and we heartily endorse many of his suggestions. From the point of view of horizontal retorts, we readily acquiesce with his constructive comments (1) that a differentiation between silica and siliceous products should first be made, and (2) that a survey of the materials commonly used for hot-patching purposes with specific reference to the type of duty expected from such materials, would be very useful. As a matter of fact, some information on materials in use for this purpose has been collected and it is hoped to give further particulars in next year's Report. However, our Report is introductory, and our conception of the job is in its early stages of development.

Although we admit that the use of organic adhesives tends to produce a friable texture in the fired materials—in fact, this is an indication of our work—we do not agree that the property of "stickability" has been over-emphasized. Again, surely every spalling test is evidence of the local strains set up by the application of a wet material to a high temperature surface. In this connection, I have obtained sufficient evidence of these strains from practical experience.

Mr. Lamprey appears to take objection to the use of "temperature" as a method of obtaining hot-patching effects. Surely, if the amount of fluxing material is to be rigidly controlled we must fall back on this other alternative. Obviously, however, the use of higher temperatures must be limited by nature of the material being patched. It is my opinion that with silica retorts, the trouble due to overheating would not arise; with siliceous and fireclay products I will not, at the moment, express an opinion. We agree that the difficulty in the use of a dry cement will be in the evolution of a satisfactory plant for the job. Bearing in mind (1) the possibility of better adhesion; (2) the smaller liability to spalling on sudden cooling, it is clear that a much better case can be made out for the wet patching of siliceous and fireclay horizontal retorts than for silica vertical retorts. Nevertheless, for reasons other than those given by Mr. Lamprey, I am certain that further research on the adhesion and hardening of various refractory mixtures is necessary for the full exploration of the subject.

A Basis of Organization for Social and Sports Clubs

By J. Leeming Robson, of the Birkenhead Gas Department.

The efficient organization of a sports club is a most important consideration. In every case the positions of executive responsibility should be occupied by men who are well qualified. The position of secretary is the key position, and should attract any who possess organizing ability, a capacity for handling men, and an infinite source of patience and tenacity.

The basis of the organization must be sound in every way, possessing a degree of elasticity, inspiring confidence (a most essential feature), and embodying the maximum of democratic principles.

The financial basis should then be determined prior to any effort to further the scheme. The amount of the contribution is a matter for adjustment, but it should be sufficient to cover the estimated necessary income, and small enough to appear to prospective members as an insignificant amount. The aggregate income from subscriptions is rarely considered when small amounts are collected regularly. While a member may hesitate to pay a sum of 5s. for a year's membership, he would hardly consider an amount of say two pence per week.

The weekly subscription seems to provide an admirable method, and when it is collected through the wages book it becomes easy of collection, regular, and ultimately the act of subscribing becomes an unconscious one. This method can only be adopted when members have declared, in writing, their willingness to have the amount deducted from their wages.

Financial Policy.

Immediately after formation, the opening of a banking account should be authorized, and security and confidence guaranteed by the allowing of operations on the account only by the joint signatures of two officers, preferably the chairman and treasurer, and then only when the central authority has authorized payments.

General Management and Control.

This question is largely one to be determined by the size of the undertaking. No hard and fast rule can be laid down. A fair basis of representation, and one which may be said to be applicable to every undertaking, is that of a committee of management, representative of one in twenty. Any greater ratio lessens interest, and may lead to an autocracy.

In a large undertaking it may be possible to base representation on departments, and when this is so it is an admirable method. The departmental method allows of more intimacy. Departments suggested are:

Shift workers.
Yard workers.
Lamplighters.
Mains.
Fitting shops.
Automatic and collection.
Office and salaried staff.

The problem of equal representation for shift workers can be solved by the constitution allowing of one substitute member. This member is then given the right to attend on the enforced absence on duty of one of the shift workers' representatives. Such a concession should not be allowed to other departments, because, in a general application of the privilege, the responsibility of management would continue to shift to members not qualified in the ordinary way. Disorganization would then be inevitable.

The principal officers should be elected at a properly convened general meeting, which should be thereafter an annual general meeting. The same principle should operate in the election of representatives to the management committee. The election of departmental representatives at a general meeting of the whole body is not advisable, for obvious reasons. It should, however, be convenient to arrange for the whole of the week following being devoted to annual general meetings of departments, thereby ensuring all members being elected by the votes of each department.

Functions.

The provisions to be made should be determined by the demand. Football, cricket, bowls, and tennis will be the main demands. Further development may be suggested in the form of cycling, swimming, boxing, amateur dramatic society, billiards, lending library, and other facilities.

The establishment of these sections increases financial responsibility. It should always be the aim of the management committee to secure complete financial control. This may seem difficult when it is necessary to allow self-government. Each section to be successful should be controlled by its own members and its own secretary. To secure financial control, members of the management committee should be appointed as chairmen of section committees. This may seem an autocratic method. In practice, it will be found easy to appoint members who are interested in a particular form of sport or social activity. Being members only of the management committee, they will readily accept a position which offers some form of control. The most important point though, is that members of the main committee are conscious of the financial responsibility, and in acting as section chairmen they are able to influence policy in accordance with that pursued by the main body.

Each section should be managed as efficiently as the parent organization, and in this connection a true record must be kept of all business transacted. The minutes of each section should be presented to the management committee and form part of the routine business of each regular meeting of that committee.

Further Development.

As activities are developed it becomes necessary to find other means than by way of members' subscriptions, of

increasing the income of the club. Social functions are a source of revenue, but other methods may be employed—*e.g.*, competitions of various kinds. This is a very important question, for it will be found that the management committee has an immense amount of work in connection with the general administration, and added duties may prevent progress.

In order, then, to develop such other functions as entertainments and competitions, special sub-committees of the management committee should be formed, and given complete control of such efforts, always provided that their actions are confirmed by the main body at its next and regular meeting. This ensures revenue-earning sections forming a separate section of the club, and still does not allow financial control to be in other hands than those of the main body.

Discipline and Conduct of Meetings.

In this and other matters there must be a fair amount of elasticity consistent with effective control.

An important circumstance to be observed in almost every form of voluntary association is that of its conduct and procedure at meetings. The absence of rules or regard for correct procedure is conducive to grave misconceptions of administrative problems, and bad government.

A club which is conducted on sound business lines and in accordance with existing law is a very valuable organization, and the effect it may have by its members being made conversant with forms of procedure is incalculable. In fact, it may be true to say that a better understanding of administrative problems and procedure would do much to remove suspicion from the minds of the workers, and certainly promote a higher standard of intelligence.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Recent Developments in Gas Fitting Practice

By R. N. LeFevre, Officer in Charge of Training, Research and Training Section, Gas Light and Coke Company, Watson House.

The gasfitter of to-day is a certified craftsman who is able to hold his own with the best of tradesmen who now find themselves called upon to carry out work of the high standard demanded by recent developments in construction and decoration. It is with a view to bringing to your notice some aspects of the work of the present-day gasfitter that I am reading this paper to-night.

Tracing back the history of the development of pipes used for internal gas supplies we find that for many years lead was used almost exclusively for this work. Services, meter connections, and all house pipes continued to be composed of lead pipe until the introduction of "compo" pipe.

The adoption of "compo" pipe was an attempt to produce a pipe at a lower cost than lead pipe, and consisted of very thin lead pipe coated on both sides with tin, which acted as a reinforcement—the lead pipe being so very thin that it would otherwise have been porous.

"Compo" pipe enjoyed the patronage of the Industry for a number of years, but it has since been almost entirely superseded by wrought-iron or mild-steel tubing, and for many years the majority of gas undertakings and contractors have run all interior supplies in wrought-iron or mild-steel tubing with screwed joints.

Screw Threads.

Undoubtedly the most important item in the work of the gasfitter is the cutting and screwing of tubing. On the normal small housing estate carcass the average number of screwed joints is no less than 170.

The thread now almost universally adopted for tubes is the British Standard Pipe Thread, which is of the Standard Whitworth form. It is used without exception in the British Commonwealth and in most other countries except the U.S.A.

It is important that the difference between parallel and taper threads should be appreciated. A parallel screw is one where the diameter is the same the whole length of the thread and is thus parallel to the axis of the pipe. A taper screw is conical, being coned one-sixteenth of an inch measured on the diameter per inch of length—*i.e.*, one in sixteen.

In the past it was customary to use a taper-parallel connection in which the male threads on the pipe end were tapered while the female fitting or coupler had a parallel screw. This is not good practice, however, as it is impossible to effect a complete metal-to-metal joint except by expanding the face of the fitting.

All British Standard malleable iron pipe fittings are screwed with a taper thread so that by their use a perfect taper-taper joint is effected. The only exception is in the case of a connector which has a long parallel screw with a running socket and back nut.

It is entirely unnecessary to use hemp with a taper-taper joint—in fact, its use defeats the object in view—namely, to make a sound metal-to-metal joint. Provided the threads are clean a joint of this nature with taper-taper threads made with a good jointing paint will stand gas, air, or hydraulic pressures of many hundreds of pounds per square inch without the use of hemp.

Connectors and double connectors having of necessity parallel threads, and requiring hemp packing, do not make a really good connection, and their use should be restricted to very low-pressure work. Fortunately, the majority of gas carcasses come under this heading, but wherever possible a union with a metal-to-metal joint should be fitted in preference to a connector.

The reason for the British Standards Institution's insisting upon taper threaded fittings will be more clearly understood after reference to the series of sections comprising fig. 1.

Fig. 1A shows a taper-threaded tube which has been entered hand-tight in a fitting having a parallel female thread. Although five threads have entered, they are all disengaged, and it will be seen that a metal-to-metal engagement occurs merely at the face of the fitting.

Fig. 1B shows the same joint after being tightened up with the wrench. It is clear that a metal-to-metal contact occurs only on about three threads, while there remain five threads which assist in making the joint neither pressure tight nor mechanically strong.

Fig. 1C depicts the taper-threaded end of a tube which has been entered, only hand-tight, into a fitting having a taper female thread. It will be seen that several threads of the pipe have entered and are all in metal-to-metal engagement with the screw fitting.

Fig. 1D shows the same joint after about two complete turns of the wrench have been applied. It is quite unnecessary to use undue force, as it will not make the joint any more sound, but may only tend to strain either the fitting or the tube. Provided that the threads are well cut and the joint is properly made, it may be undone and both the fitting and the tube used again should the occasion ever demand it.

It will be obvious that the use of hemp is detrimental to the making of a good taper-taper joint—although it had to be used to pack the imperfect joint which was produced with the taper-parallel connection. A parallel threaded

* Extract from a paper before the London and Southern District Junior Gas Association, Dec. 9, 1932.

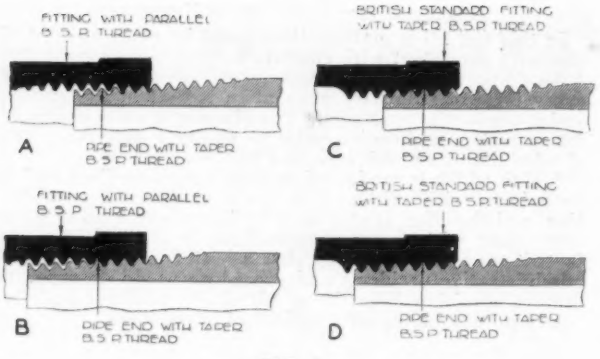

FITTING WITH PARALLEL B.S.P. THREAD
BRITISH STANDARD FITTING WITH TAPER B.S.P. THREAD
A
PIPE END WITH TAPER B.S.P. THREAD
C
PIPE END WITH TAPER B.S.P. THREAD
FITTING WITH PARALLEL B.S.P. THREAD
BRITISH STANDARD FITTING WITH TAPER B.S.P. THREAD
B
PIPE END WITH TAPER B.S.P. THREAD
D
PIPE END WITH TAPER B.S.P. THREAD

FIG. 1.

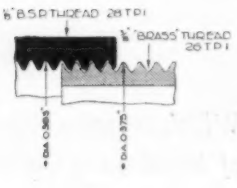


FIG. 2.

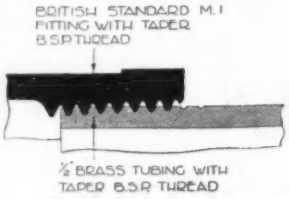


FIG. 3.

fitting, if subjected to undue stress in screwing home the tube, may be distorted and thus rendered unfit for subsequent use.

Threads for Brass Tubing.

There still exists a screw thread known as the "Brass" thread and sometimes referred to as the "Gasfitters'" thread. It has a pitch of 1/26 in. (*i.e.*, 26 threads to the inch) for all sizes of tubing. In the past it has been used extensively for threading brass and copper tubes and fittings. The use of this thread, however, has caused many difficulties, as no definite diameters were laid down and practically nothing was interchangeable or well fitting. For some years past it has been the practice to eliminate this unstandardized thread wherever possible, and its use is fortunately dying out so rapidly that it may now be considered obsolete.

All brass tubing should be threaded with the British Standard Pipe Thread, provided that it is made in accordance with the specification which will later be outlined. No difficulty will be experienced, as brass and gunmetal fittings are now available as standard articles tapped with British Standard Pipe Threads, and reputable gas appliance manufacturers are making their brasswork to conform to the British Standard where necessary.

If, in a modern installation consisting of wrought-iron or mild steel carcass pipes and brass or copper connections, the old 26 threads to the inch were used, there is certain to be at least one faulty joint. The reason for this is that at some point brass must meet iron or steel, and in order to effect a connection either the brass tubing must be threaded with a British Standard Pipe Thread, or the steel tubing must be screwed with the old brass thread.

Very often an attempt is made to screw a brass thread into a British Standard Pipe Thread, particularly in the case of $\frac{3}{8}$-in. brass tubing and $\frac{1}{8}$-in. wrought-iron or mild steel sockets and fittings, or $\frac{1}{4}$-in. brass tubing and $\frac{1}{4}$-in. British Standards female threads. The effect of such a union is illustrated in fig. 2, where a $\frac{3}{8}$-in. brass thread (26 threads per inch) is being screwed into a $\frac{1}{8}$-in. female British Standard pipe thread. Although it is possible by using considerable force to effect a joint, it can never be anything but a very bad one, owing to the difference in the pitches and diameters of the two threads.

One of our mistakes in the past has been the assumption that certain sizes of brass and copper tubing have the same external diameters as certain sizes of iron and steel tubing. Brass and copper tubing is measured and designated by its outside diameter, and we have been known to say that $\frac{3}{8}$-in. brass tubing has the same outside diameter as $\frac{1}{8}$-in. wrought-iron and mild-steel tubing when, as a matter of fact, the outside diameter of $\frac{1}{8}$-in. wrought-iron tubing is 13/32 in., or 1/32 in. greater than $\frac{3}{8}$-in. brass, which has an outside diameter of exactly $\frac{3}{8}$ in. Similarly, $\frac{1}{2}$-in. brass tubing has an outside diameter of exactly $\frac{1}{2}$ in., while the outside diameter of $\frac{1}{4}$-in. wrought-iron and mild-steel tubing is not $\frac{1}{2}$ in., but 17/32 in.

Now the British Standard Pipe Thread is used on all brass and copper tubing, but if, for example, a piece of $\frac{1}{2}$-in. brass tubing be threaded with a $\frac{1}{4}$-in. British Standard Pipe Thread, it follows that it will not be possible to obtain a full crest to the threads. They will be short to the extent of about 1/64 in.—*i.e.*, a half of the 1/32 in. by which the diameter of the brass tubing is smaller than that of the iron. A gap is thus formed which is clearly illustrated in fig. 3.

By making the wall of the tube slightly thicker, so that, in the case of $\frac{1}{2}$-in. brass tube, it has the same outside diameter as $\frac{1}{4}$-in. iron, it is obvious that it can be screwed with a perfect $\frac{1}{4}$-in. B.S.P. thread. The manufacturers of brass and copper tubing can supply tubes with the requisite outside diameters and to gauges which enable this to be done. As an example, instead of using $\frac{1}{2}$-in. tubing for such work as connecting gas fires, &c., 17 gauge tubing of 0·515 in. outside diameter should be used. Although this is now the standard practice of my Company, we still refer to this tubing as "half-inch brass"—or, more accurately, as $\frac{1}{2}$-in. (nominal diameter) brass tubing.

Before dismissing this important subject of pipe threads it is opportune to add a few remarks on the forms of screw threads which exist in this country and which are to be encountered daily by the gasfitter. They are:

(1) *The British Association Thread.*

B.S.I. Specification No. 93, known as the "B.A." thread. It is used largely on small articles and screws from about $\frac{1}{16}$ in. to $\frac{3}{8}$ in. diameter. It has been adopted extensively by the electricity industry for small nuts, bolts, terminals, &c., and finds considerable favour in the Gas Industry for similar applications. Articles such as small injectors, component parts of thermostats, burner gallery screws, &c., are screwed with the B.A. thread.

(2) *The British Standard Whitworth Thread.*

B.S.I. Specification No. 92.—This thread is used throughout the whole engineering industry for nuts, bolts, screws, &c., for general use. Being a coarse thread, particularly in the larger sizes, it is suitable for tapping iron castings and for threading iron and steel bolts and screws. In the Gas Industry we find it being used for the assembly of cookers, fires, industrial appliances, &c.

(3) *The British Standard Fine Thread.*

B.S.I. Specification No. 84.—This thread is likely, in the course of time, to replace the Whitworth thread to some extent. The form and diameter are practically the same as the Whitworth thread, but the number of threads per inch is slightly higher throughout the whole range, which makes the thread, for the complete range of large and small sizes, slightly more generally useful to engineers as a whole.

(4) *The British Standard Pipe Thread.*

B.S.I. Specification No. 21.—This thread has already been described. This—and no other—is recommended for all tubes, fittings, and connections on appliances.

(5) *The British Standard Copper Tube Thread.*

B.S.I. Specification No. 61.—This is a thread designed for use on light-weight copper tube for low pressures. Its use is, however, gradually dying out, as in most cases heavier gauge tube is being used, screwed with the British Standard Pipe Thread.

(6) *The Old* 26 *T.P.I. "Brass Thread."*

No B.S.I. Specification.—As already explained, this thread is now rapidly being displaced by British Standard Threads.

It is interesting to note that all the first four forms of screw threads are to be found on any modern British gas appliance such as a cooker or water heater. The gas and water connections will, of course, be screwed with the B.S.P. taper thread; the nuts, bolts, and screws used in the assembling of the castings will be to either the British Standard Whitworth or the British Standard Fine Specification; while the small brass screws used in the thermostat, &c., will carry a British Association thread.

Rigid Meter Connections.

Many types of rigid meter connections have been examined and tested with a view to finding the type most suitable for our use. The outcome of this work has been the design of an entirely new form of meter connection——fig. 4—which embodies all the best points in the various types which have been examined.

The G.L.C. Meter Bar.

The general arrangement of the meter bar is illustrated in fig. 5. It consists of two 1 in. by $\frac{1}{2}$ in. by 1 in. malleableized cast-iron tees, A.A., united by a solid mild-steel rod, B. The outlets of the tees are bushed, and into each of these bushes, C.C., a swivel, D.D., is screwed. These swivels, or offsets, are made in the form of "S"

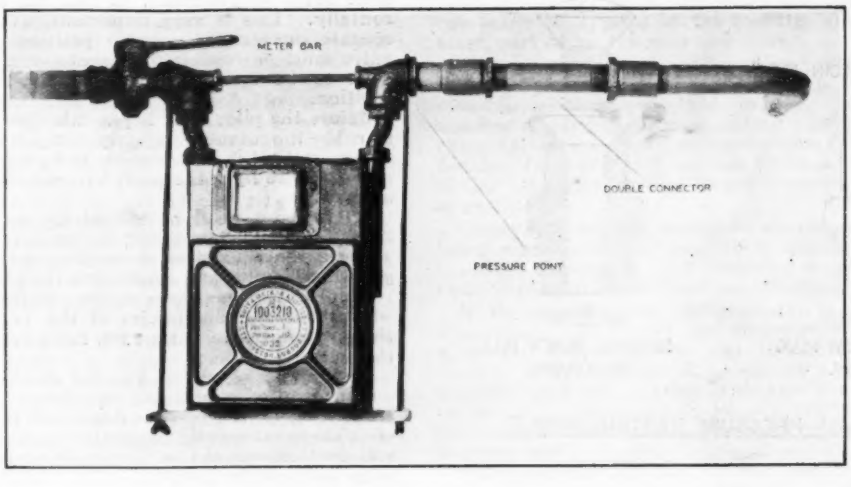


FIG. 4.

bends, and carry the meter union caps, E.E. The swivels can be rotated to permit the centres of the caps to coincide exactly with the centres of the meter bosses. After the meter has been connected it is supported by means of an ash platform, G, and the two hangers, H, tightened by wing nuts, J. A pressure point is incorporated at K.

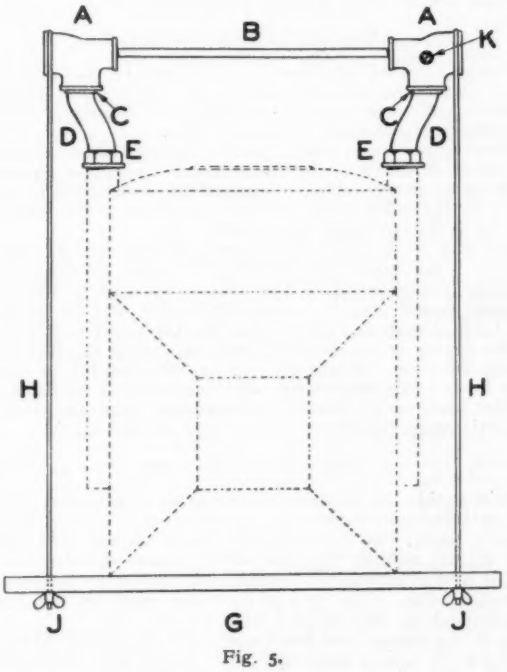


Fig. 5.

The bar is suitable for all meters from the 3-light size up to and including the 240 c.ft. per hour high-capacity size. Larger meters are fitted with rigid connections in the same manner as is now customary for very large meters except, of course, that by-passes need not be fitted unless either the size of meter or special circumstances demand their use.

Advantages of the Meter Bar.

Cost of Bar.

The cost of the meter bar is very much less than that of the usual 3 ft. of lead pipe, solder, methylated spirit, flux, unions, meters, shelf, &c.

Saving of Materials.

The adoption of the meter bar will save considerable expense with items such as:

Meter shelves,	Methylated spirit,
Brackets,	Flux,
Screws,	Rubber blow-pipe
Rawlplugs,	tubing, &c.
Solder,	

Reduction of Tool Kit.

With the passing of lead pipe for gas connections it will be possible to dispense with several tools. These are:

Blow lamp,	Spirit can,
Rasp,	Springs,
Knife,	Bobbins,
Turnpins,	Followers, &c.

The wastage of many of these items has been considerable.

Exchanging.

It is a simple matter to exchange a meter either for another of the same size or for a different size.

Other Advantages.

By installing the meter bar at the time the service is run to the building, fitters are given a definite meter position, thus eliminating the difficulty of connecting the meter to two pipes.

Rigid connections hamper and complicate efforts to effect illicit connections.

The meter bar certainly presents a very much more workmanlike appearance than lead pipe.

There are none of the disadvantages associated with lead pipe—*i.e.*, kinking, flattening, &c.

Meter Testing Device.

For years past past it has been the custom for gasfitters and others to test gas meters of doubted accuracy *in situ* by observing the movement of the test dial first with one small burner in use and then on the full load of the installation. Such a crude and unreliable test has proved far from satisfactory, especially since the adoption of so many low-consumption appliances, such as refrigerators, hot water accumulators, and the like.

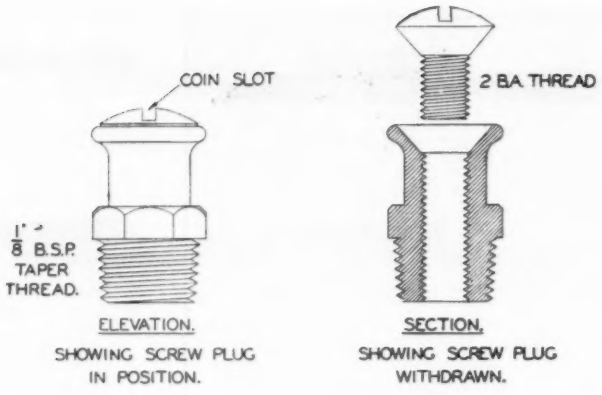
The G.L.C. Meter Testing Device is the solution to the problem. It consists of a small brass float carrying five No. 1 governor burners. It is contained in a small metal box having a short length of rubber tubing to enable connection to be established to a suitable point. Each of the burners has a governed rate of consumption of 1 c.ft. per hour, and is brought into operation by turning upwards—the swivel, by means of which each burner is connected to the float, being in the form of a gas cock. Since there are five burners it is possible to obtain any rate of gas consumption between 1 and 5 c.ft. per hour in steps of 1 c.ft. Meters may thus be tested *in situ* with an accuracy as low as 1 c.ft. per hour.

Meter and Pressure Testing Nipple.

The use of the water gauge for testing new carcasses for soundness has long been recognized as the best practice, but until recently insufficient attention has been directed to its use for testing *all* new work such as extensions to existing installations, and for locating partial stoppages in supply pipes.

This oversight may be excused on the grounds that frequently a suitable point for attaching the gauge was not available.

A standardized pressure point is now available, known as the G.L.C. Meter and Pressure Testing Nipple. It consists of a small brass nipple screwed ¼ in. B.S.P. taper male thread, as shown in fig. 6. It is intended to be permanently attached to the outlet of every meter either by means of a tee or by drilling and tapping the outlet



G.L.C. STANDARD PRESSURE TESTING NIPPLE.

Fig. 6.

pipe. On the G.L.C. Standard Meter Bar special tappings have been provided for attaching this pressure nipple. The nipple is plugged by means of a 2-B.A. french screw having a coin slot.

It is proposed eventually to fit this device to all meters, so that there will always be a convenient point near the meter for use when taking pressures, locating stoppages, setting governors, or using the Meter Testing Device.

It is also intended to be fitted to appliances to enable them to be adjusted to correct working pressures, while on large installations it will often be advantageous to fit these nipples at various points on the carcass to facilitate pressure taking.

Safety Cut-Offs.

The ever-growing popularity of continuously operating thermostatically controlled gas appliances opened up an awkward problem with regard to their installation on premises supplied *via* prepayment meters. If the gas supply to such an appliance were interrupted, would the consumer remember to re-light it when placing another coin in the meter? Particular appliances equipped with automatic cut-offs are already no doubt familiar to you, but it was felt that the need existed for a simple and inexpensive cut-off which would ensure safety not only on prepayment supplies but on any appliance where by-pass failure or flame extinction might be a source of danger.

A new safety cut-off known as the G.L.C. Thermo Cut-Off has in consequence been designed and is available. It is made in four sizes:

1	¼	in.	suitable for gas rates up to	40	c.ft.	per	hour
2	½	,,	,,	100	,,	,,	
3	¾	,,	,,	200	,,	,,	
4	1	,,	,,	300	,,	,,	

The ¼-in. size is suitable for low-consumption storage heaters, drying cabinets, flueless heaters, &c., while the 1-in. size is suitable for multi-point geysers up to 5 gallons per minute per 40° F. rating.

The arrangement consists of three main parts—the valve, the pilot, and the connecting tube.

The method of operation is precisely similar to that of the remote control thermostat. Fig. 7 shows the general arrangement of the device. The valve is fitted

G.L.C. THERMALLY OPERATED GAS VALVE.

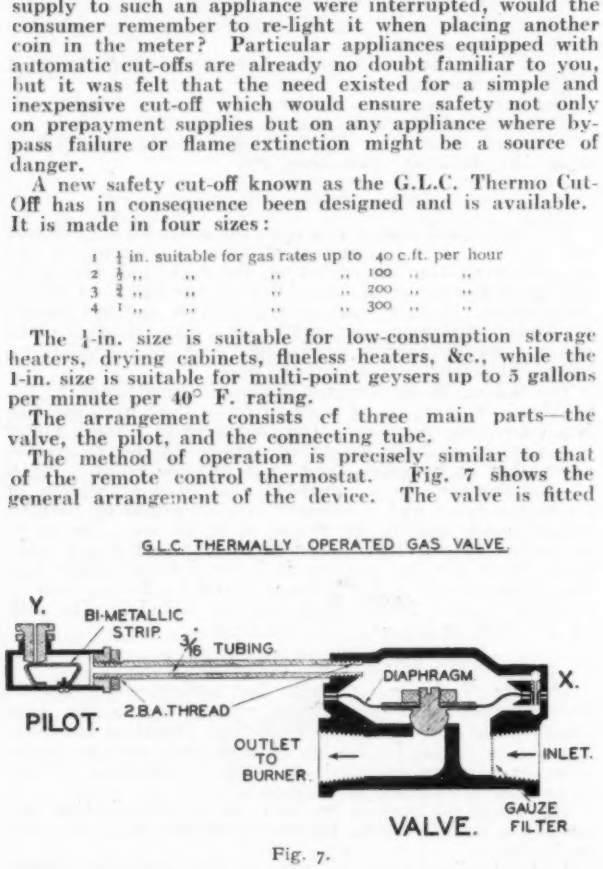


Fig. 7.

on the main gas supply to the appliance, and the ⅛-in. tubing is bent as desired to enable the pilot to light the burner. It must be near enough to light the flames of the burner but must not be touched by them. The pilot head must be positioned so that the flame projects horizontally. This is very important, as the device will not operate successfully in other positions. Since the control valve must be mounted horizontally, the tube will usually need to be bent to bring the head into the required position.

Before the pilot head is put into operation—*i.e.*, when it is cold—the bi-metallic strip completely closes the pilot orifice, so that it is impossible to light the pilot. It is also impossible to light the main burner because the main valve is closed.

If the pilot head be heated by means of a match or taper for about 30 seconds, the bi-metallic strip will bend. The clearance exposes the orifice, and permits a flow of gas which ignites and constitutes the pilot flame.

Immediately gas flows in the connecting tube the pressure above the diaphragm of the valve is reduced, and the valve opens to permit the main supply of gas to reach the burners.

Should the supply of gas fail due to lack of money in an automatic meter, &c., or should the pilot flame be blown out, or the by-pass flame and pilot be extinguished on a thermostatically controlled appliance, the pilot head will cool down, and in about 30 seconds the bi-metallic strip will seal the by-pass orifice. Immediately this occurs the pressure above the diaphragm will build up the pressure below the diaphragm and the valve will fall on to its seating and effectively shut off the main supply.

A small orifice by-passes the diaphragm so that when the pilot orifice is open there is sufficient loss of pressure through the orifice to lift the diaphragm and valve.

The connecting tube is ⅛-in. brass tubing and is screwed 2 B.A. thread.

The inlet to the valve is provided with a gauze filter to prevent the entrance of foreign matter which might find its way to the valve or its seating.

Gas Fire Check Meters.

The gas fire check meters so frequently encountered in hotel, boarding-house, and similar bedrooms were—the majority of them—almost speaking testimony of all that was unsightly in gas fitting practice.

They give the casual visitor (very often himself a potential customer) the impression that gas apparatus must of necessity be accompanied by a network of visible pipes in the same way as some people still think of wireless in terms of poles and wires.

The modern hotel bedroom presents an entirely different aspect. No pipes are visible, the tiny check meter is fitted in a neat crackled enamelled case, and a flush fitting skirting board plug-in connector is provided for attaching the boiling ring or curling iron heater when required.

The meter is connected direct by means of steel tubing inside the case. When the visitor lifts the lid to insert a coin he is confronted with neat instructions as to the use of the meter. It has been suggested that an attractive advertisement might also be pasted inside this lid.

Plug-In Connectors.

This fitting is becoming increasingly popular, and its installation has now become an important part of the gas-fitter's work. It has recently been modified in design. The rolling rubber ring has been dispensed with, and the seal is now effected by a simple cone union giving a metal-to-metal joint. The seal is thus the same as the normal union used on meters and appliances.

In living rooms and bedrooms it is preferable always to fit the flush fitting skirting board type of plug-in connector which will be in keeping with the general tendency to conceal all piping and connections. Where this is either impossible or undesirable other types are available. They are:

(*a*) Simple plug and socket, suitable for attachment to an existing point such as the end of a cooker manifold.

(*b*) Plug and socket, flange type, suitable for fitting on bracket block on wall or on the floor. This is supplied with and without an additional stem cock.

(*c*) Plug and socket, through type. This has two side connections so as to form a tee. It can thus be fitted in a run of pipe.

Fixing Water Heaters.

No other appliances have been subjected to quite such revolutionary changes as gas water heaters. The modern storage heater and geyser are now so extremely well finished that they call for particularly good craftsmanship on the part of the fitter who installs them.

One cannot imagine a white enamel-cum-chromium plated geyser being fitted in the manner in which geysers were fitted only two or three years ago with lead pipe,

plumber's black round the joints, brass stop cocks, iron pipe hooks, and the like.

To-day, all the connections are made direct in wrought-iron or mild-steel tubing, and all visible tubes, fittings, and taps are plated to match the geyser. In this connection my Company maintain at Watson House a complete plating plant which is able to maintain a 48-hour service to the district. If an appliance is to be fitted with all visible work plated, it is first installed and the necessary connections are made. These are forwarded to the plating shops, where they are plated and returned to be fitted with the minimum delay. The fitting of this plated work calls for extreme care on the part of the fitter. He must not use unnecessary force to make his joints or deface the tubes or fittings with grip marks. Special adjustable spanners are issued for use on unions and other flat surfaces.

It is not generally realized that gas storage water heaters are supplied with brackets to enable them to be fitted on walls. In many kitchens, where floor space is limited, this method of fitting is to be recommended.

The importance of the use of lagging on all exposed hot pipes and surfaces on a gas-heated hot water system has still to be fully appreciated. Lagging pipes results in a saving of gas to the value of ½d. per foot per week by reducing the maintenance rate to which the thermostat will adjust itself; 50 ft. of unlagged hot water pipe will thus involve the consumer in an unnecessary expenditure of over £5 per annum. A very simple method of lagging storage tanks and pipes has been devised which can easily be applied by the gasfitter and is now a recognized part of his training and work.

The practical examination in gas fitting held by the City and Guilds of London Institute is the largest craftsmanship examination held in this country, and the number of candidates increases each year. In addition to examination and certification by the City and Guilds of London Institute, the London District of the Federation of Gas Employers has its own scheme for the classification of gasfitters.

Under this scheme, gasfitters are placed in one of three categories dependent upon their qualifications of craftsmanship, experience, and technical knowledge, and their rates of pay are determined accordingly.

In the examinations craftsmanship is held to be of first importance. If a man can screw in a screw and do it properly; if he can cut and thread a piece of tubing exactly to dimensions; if he can fit a meter dead plumb and level and take a pride in doing these small things perfectly—if, in other words, he is a craftsman—he will experience no difficulty with any work he may be called upon to carry out.

The consumer sees more of the gasfitter than any other representative of a gas undertaking. His work remains as a joy or an eyesore for all time—good gas fitting practice is, I suggest, one of the best advertisements we have.

Discussion.

The PRESIDENT (Mr. A. Tennant, East Surrey Gas Company) said they had listened to a paper by an expert. They were all familiar with the work carried out by Mr. LeFevre, and the leaflets containing his artices re-printed from the "Gas Salesman" were very valuable indeed to all those interested in gas fitting practice. He recommended all gas undertakings to obtain supplies of these for the use of their fitters. The many developments which Mr. LeFevre had not only referred to in his paper but had demonstrated were very convincing. The Gas Industry was indebted to the Gas Light and Coke Company for the work they carried on at Watson House and which they were so generousy making available to the Industry as a whole. The author had referred to the use of compo pipe as a thing of the past, but Mr. Tennant wished that this was really so; there were still many undertakings, particularly in the north of the country—though also to some extent in the south—employing this type of pipe simply because it was cheaper and easier to run. He would, however, raise a protest against the use of compo pipe, for it constituted a positive danger. The paper had mentioned the use of wrought-iron and mild-steel tubes; it was rather the practice to use mild steel for internal work and wrought iron for services and where the pipe was exposed to atmospheric conditions. He inquired what Mr. LeFevre recommended as good practice. He was glad that the author had touched upon the important subject of pipe threads, and he asked if he could give them any information in regard to the loss of pressure with the meter bar as compared with lead connections. There was sometimes a good deal of pressure loss at the meter if the latter was of inadequate size or embodied bad connections. He was particularly interested in the meter bar, and inquired if this was in actual use yet or whether it was still in the experimental stage. In conclusion, Mr. Tennant asked if any trouble had been experienced in regard to vermin getting into the hair felt used for pipe lagging.

Mr. S. C. WALDOCK (Gas Light and Coke) also asked for further information in regard to the meter bar, and inquired if any gas undertakings in this country had adopted the system—either on the American, German, or English lines.

Mr. B. G. MAISEY (Croydon) asked for information on the plug and adaptor. Mr. LeFevre had referred to the type which faced downwards to prevent the dust getting in; but would not the type set horizontal on the floor be subject to dust, particularly when the housemaid or housewife was dusting it with a brush?

Mr. J. R. GALE (North Middlesex) referred to the battery of meters illustrated in the paper, and inquired if these were slot meters, suggesting that it would be somewhat inconvenient for the occupiers of flats to have to come down to the basement every time they had to put a fresh coin in their meter.

Mr. J. BRIGGS (East Surrey) asked if any difficulty was experienced in regard to dust or foreign matter getting on to the test burner nipples, thus causing less gas to pass than the stipulated amount for testing purposes.

PRODUCTS OF COMBUSTION.

Mr. A. J. THOMPSON (Gas Light and Coke) raised the point of products of combustion and the possible danger of the use of multi-point heaters in bathrooms—for instance, the effect of someone turning on a tap in another part of the house while the bathroom was in occupation.

Mr. S. A. TENNANT (Croydon) asked for further particulars in regard to the pressure testing nipple on existing and extended installations. Was the main cock turned off and the test carried out through the meter, and what happened when a small fault was found on the installation? Was it the general practice to go through the whole house?

Mr. C. F. PETERSEN (East Grinstead) inquired if anything was being done in the nature of a substitute for compo pipe for surface work.

Mr. P. RICHBELL (Croydon) said that Mr. LeFevre had made a very strong point in regard to pipe threads, and he endorsed what had been said in every way. But there was one point which he did not appreciate, and that was in relation to the wrought-iron fittings supplied by manufacturers with parallel threads, with the result that they were still in the same position in regard to the making of satisfactory joints. As to the automatically-controlled gas valve, did he understand that so far as the normal by-pass was concerned, this was displaced altogether? He also inquired if the small meter for fitting in bedrooms was definitely on the market, and, if so, by whom it was supplied.

Mr. H. W. HOLGATE (Gas Light and Coke) asked if the hemp packing could be displaced on water work.

PIPES FOR GAS-WORK.

Mr. LEFEVRE replied to the various points raised up to this point in the discussion. In regard to wrought-iron pipes, his Company utilized this tubing, steam weight quality and wrapped, for services. They only used steel piping for interior work. In regard to pressure loss across the meter bar, many of these were connected in series, and the pressure loss at each bar was infinitesimal. Quite a number of these meter bars were in use, including two large blocks of flats—one of which was Fulham Court—and they found them invaluable there; for they had to be fitted in fairly low-ceiling rooms with only just sufficient clearance above the doorway to get them in. With lead piping it would have been very difficult. In reply to the point raised as to vermin getting into the pipe lagging, this had been guarded against, and the lagging was chemically treated.

Referring to the meter bar again, Mr. Waldock had been instrumental in bringing these into use in this country, and, as a matter of fact, they had received several inquiries in regard to them from gas undertakings in the north, and it was hoped they would all adopt them. In connection with Mr. Maisey's question as to dust getting into the plug points, they had never experienced trouble from dirt in this respect, and there was, after all, very little difference between these fittings and the ordinary electric plug-in connector. In reply to Mr. Gale, Mr. LeFevre stated that the battery of meters illustrated in the paper were ordinary meters and not prepayment.

METER TESTING.

Regarding Mr. Briggs' question on the meter testing device, instructions were given to the Company's fitters to light all five burners before using the apparatus for testing purposes, so that they could immediately detect any difference in the size of the respective flames. It was unlikely that there would be exactly the same amount of dirt in all five burners. If one of them was at fault it could easily be checked. In regard to Mr. Thompson's point, Mr. LeFevre stated that if a tap outside the bathroom were turned on, causing the multi-point heater suddenly to come into operation, thus alarming anyone who happened to be in the bathroom, a cut-out tap could be fitted which could be turned in the bathroom, thus preventing anyone outside causing the apparatus to come into operation. Replying to Mr. S. A. Tennant, when they carried out an extension to existing installations, before anything was done a U-gauge was attached to the pressure testing nipple.

The consumer was asked to turn off all taps, and the main cock was closed. Then if the gauge fell there was a leak. He was devising at the present time a table to indicate the amount of the leak represented by falls of the gauge. If it were only an inappreciable leak a further test would be made, so that when the work was completed if the new work was sound the rate of escape should not be greater than it was to begin with. In fact, it should actually be less. If, on the contrary, the gauge fell at a greater rate, obviously the new work was unsound. The table to which he had referred would make the fitters' work very much simpler. A pressure gauge was undoubtedly the only way to do it.

In reply to Mr. Petersen, Mr. LeFevre stated that they had experimented with the use of copper tubing as a substitute for compo, while brass tubing met the case very well—though copper even better, by using heavy gauge tubing to take B.S.P. threads. In reply to Mr. Richbell, he agreed that wrought-iron fitings were still supplied with parallel threads, which was one of the reasons why they used only malleable fittings for interior work. The pilot referred to in the paper did not displace the ordinary by-pass—but displaced the ordinary pilot. In thermostatically-controlled apparatus they still had the by-pass, the device he had mentioned being in addition thereto. He stated that the small gas-fire check meter referred to in the paper was not yet on the market, though they hoped it would be shortly. In reply to Mr. Holgate's question regarding the use of hemp on water work, with the British Standard taper-taper connection the use of hemp was not only unnecessary but definitely bad. It must still be used, however, for parallel threads on connectors.

Mr. Dawkins (Gas Light and Coke), in regard to the meter bar, inquired if there were any stipulations as to the pipes supporting the meter.

Mr. J. H. C. Bates (Gas Light and Coke), in reference to the cut-off tap for attachment to multi-point heaters in bathrooms, stressed that the products of combustion were harmless if the geyser were properly fitted and adjusted.

Mr. J. H. Goldsmith (South Suburban) remarked that it struck him that the attachment on the meter bar was rather weak. It looked as if it would be quite easy to pull the support adrift from the pipe. Another point was the fact of the connector being shown as a standard connector at the outlet of the meter when Mr. LeFevre had mentioned that connectors should be abolished. It would seem that a union could be fitted rather more cheaply.

Mr. J. E. Pugh (Gas Light and Coke) asked if it was possible to incorporate the American method for cutting off the gas supply in their own meter bar.

Mr. C. A. Masterman (Gas Light and Coke) congratulated Mr. LeFevre on his address. In regard to the weight of the meter, they had persuaded the makers so to reinforce the meter that they could put a large pull on the unions and do away with the connections. As to the use of standard unions on meters, this was one of those difficult cases where standardization had rather got them into trouble. Meter unions were standardized to a bastard thread at the Board of Trade some years ago. Referring to the use of the pressure-testing nipple at the appliance itself, they tried to persuade the manufacturers to embody this nipple on their appliances so that one could test the gas rate at the appliance by testing the pressure. Their activities at Watson House included a wide range of work which it was considered might prove of value to the Industry. They were, however, dependent upon the district utilizing what they developed, and he had a feeling that in this respect they were rather unpopular at times. One was fighting against circumstances; they were trying to assist the Industry, but things were moving so fast that they must keep pace with them. The consumer to-day was demanding neater fittings. The ordinary gas fire, for instance, was run with relatively large brass tubing; and it occurred to them to make a test, with the result that it was discovered that the vast majority of fires could be run with smaller tubing, which would make a much better job of it. The real moral of Mr. LeFevre's paper was "getting back to the simplest things."

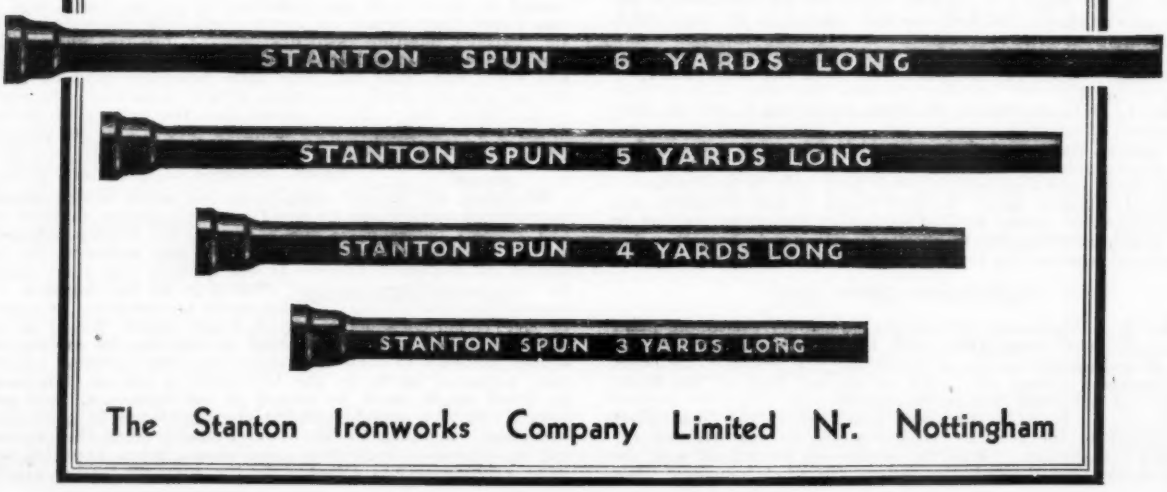
Mr. P. F. Scarth (Gas Light and Coke) asked for information as to the running of piping under the modern tiled hearth to gas fires.

Mr. A. J. Swann (Gas Light and Coke) referred to the use of male and female bends and elbows, and asked for information regarding the use of these.

The Author's Reply.

Mr. LeFevre, replying to the remainder of the discussion, said that in regard to the weight of the meter, he had been interested to learn that afternoon from one of his colleagues who had fitted a strap underneath a meter, that this supported a weight of 8¾ cwt. In reply to Mr. Bates, he said that so far as the use of multi-point heaters in bathrooms was concerned, there could be no possible danger as long as the apparatus functioned properly. It was really more of a psychological matter than anything else. He assured Mr. Goldsmith that no attachment would be required in the future when the new meters he referred to were available—and this answered Mr. Swann's question regarding the use of male and female bends and elbows. If one fitted a union at the outlet for subsequent disconnection that union would have to be a flat-faced one; and having undone it, how were they to get it out? An ordinary connector was useless; where one had pipes rigidly attached at both ends one must have a double connector. Replying to Mr. Pugh, Mr. LeFevre said that when

STANTON
DELAVAUD
Spun Iron Pipes
3, 4, 5 and 6 Yards Long



The Stanton Ironworks Company Limited Nr. Nottingham

a meter had to be taken down they should plug and seal the inlet connection to the meter bar—and they then had a capped service. In reply to Mr. Scarth's point of tiled hearths, he said that it was usually rather a costly matter to run a concealed gas pipe to an existing fire; but his Company had recently adopted a hearth plate of "Asbestone" to go over the existing hearth, with the concealed connection underneath. In the case of new buildings, they took every opportunity to ensure that the concealed connections were taken to the back of the fireplace.

VOTE OF THANKS.

Mr. H. C. SIMS (South Metropolitan), Senior Vice-President, said it was his pleasure to propose a hearty vote of thanks to Mr. LeFevre for his excellent paper, to the preparation of which the author must have given a great deal of time and trouble to have dealt with his subject in such a comprehensive manner.

Mr. F. C. SMITH (Gas Light and Coke), Junior Vice-President, seconded the vote of thanks, remarking that Mr. LeFevre had done well to remind them of the importance of craftsmanship. Their Association had discussed subjects relative to manufacture and distribution, but they frequently forgot to discuss the importance of craftsmanship, and he had done them a great service in this matter. He was right in emphasizing the importance of the gas fitter, for upon the fitters' work very largely hung the reputation of the gas undertaking. One could do a great deal to make the fitters' work easy, but if their craftsmanship was deficient, the reputation of the gas undertaking would suffer, thus rendering it more difficult to get other gas installations in the house. In regard to compo pipes, the Gas Light and Coke Company did not approve of the use of these, but it must be recognized that some undertakings would have to continue them for a considerable period of time. If it was fitted carefully it became a much less serious matter than if it was hung carelessly about the room. In conclusion, Mr. Smith said he felt that there was a great field for the use of steel tubing.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords.

Special Orders.

Special Orders on the application of the Watford and St. Albans Gas Company and of the Weymouth Consumers' Gas Company have been laid before the House and referred to the Special Orders Committee.

The Special Orders Committee is meeting on Tuesday, Dec. 20, to consider the following Special Orders: Buxton; Grantham; Hampton Court; Coatbridge; and Liverpool.

House of Commons.

Special Orders.

The following Special Orders have been presented and ordered to lie upon the Table of the House: Watford and St. Albans Gas Company; Weymouth Consumers' Gas Company.

Joint Committee on Basic Prices.

The House of Commons has appointed the following M.P.'s to join with the Committee of five Lords to consider the question of basic prices for gas undertakers: Dr. A. B. Howitt (Unionist—Reading); Mr. Oswald Lewis (Unionist—Colchester); Captain Peake (Unionist—North Leeds); Mr. Thomas Williams (Labour—Don Valley); and Mr. Ernest Young (Liberal—East Middlesbrough).

The Committee is empowered to hear Counsel to such extent as they see fit; to send for persons, papers, and records. The quorum is fixed at three.

Use of "Coalite."

Mr. C. WILLIAMS asked the First Commissioner of Works what was the artificial fuel at present used in the House of Commons, and if it was in general use in Government Departments.

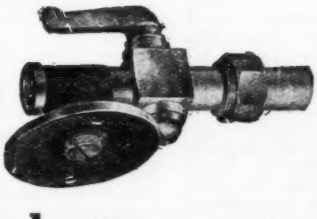
Mr. ORMSBY-GORE said that the fuel at present used in the open fireplaces in the House of Commons was a low-temperature carbonized fuel known as "Metro-Coalite;" it was in use in Government Departments in London to the extent of about 25% of the total requirements for open fireplaces. This was in pursuance of the policy of the Government to assist low-temperature fuel organizations.

Mr. WILLIAMS then asked if the fuel was in general use in the Palace of Westminster, and if any Department had refused or expressed a desire not to use this fuel—for instance, the House of Lords?

Mr. ORMSBY-GORE said he believed that the users of certain fireplaces in the House of Lords did not wish to have this new fuel.

IF WINTER COMES

This is what you will want.

Two-way  *Gas Fire Tap.*

Hadn't you better get them now?

Can be fitted with patent Locking device if desired.

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75202 Nottingham.
2645 Watford.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

The uncertainty regarding the War debts payments was responsible for a diminution in the volume of business on the Stock Exchange last week, and with the close approach of the holiday season it is not anticipated that conditions will improve to any great extent until the New Year. The gilt-edged section was almost the only department to report any progress, and the influx of business was due mainly to the large Treasury payments on Dec. 1, much of which was re-invested in the Funds.

There was no falling off in the demand for Gas stocks and shares, though available supplies were somewhat limited last week. Gas Light units were as usual well supported, and the price rose 1s. to 25s. Imperial Continental went ahead again after the recent *ex* div. marking down and gained 3 points to 203. Bournemouth sliding-scale was also quoted 3 points higher at 200, business being done at 202. Inquiries for Shrewsbury 5 p.ct. took the price up 5 points to 120½, while the majority of the other changes consisted of small rises.

An interesting announcement last week was that relating to the formation of a new Company, to be known as the South-Eastern Gas Corporation, for the purpose of acquiring a controlling interest in several gas undertakings in Kent, which include the Folkestone Gas and Coke Company, the East Kent Gas Company, the Deal and Walmer Gas Company, and the Whitstable Gas and Coke Company. The policy of the new Corporation, which will be a Holding Company, is to co-ordinate financial and technical administration, and the initial capital will consist of £323,000 of £1 ordinary shares.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Dec.* 12.

There is little change to report in the prices of tar products, which are as follows:

Pitch is firm at 100s. per ton f.o.b.

Creosote is 3½d. to 5d. per gallon f.o.b., according to specification.

Refined tar is about 4½d. per gallon in bulk at makers' works.

Pure toluole is about 2s. 5d.; pure benzole, about 1s. 11d. to 2s.; 95/160 solvent naphtha, about 1s. 8d.; and 90/140 pyridine bases, 3s. 9d. to 4s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Dec. 12.

The average prices of gas-works products during the week were: Gas-works tar, 33s. to 38s. Pitch—East Coast, 85s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 85s. f.o.b.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 5½d. to 5¾d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 4½d. Heavy naphtha, North, 10½d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2¼d. to 2¾d.; low gravity, 1¼d.; Scotland, 2¼d. to 2¾d. Heavy oils, in bulk, North, 4¾d. to 5¼d. Carbolic acid, 60's, 1s. 6¾d. to 1s. 7d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Dec.* 10.

Conditions remain quiet in this area and no change is anticipated until the turn of the year.

Crude gas-works tar.— The actual value is 45s. to 50s. per ton *ex* works.

Pitch.—Export value is nominal at 92s. 6d. to 95s. per ton f.o.b. Glasgow. In the home market quotations continue firm at 100s. per ton *ex* works in bulk.

Refined tar to Ministry of Transport Specification is steady at 3¾d. to 4d. per gallon *ex* works naked, according to quantity.

Creosote oil.—Few orders are being received, and quotations are unstable. B.E.S.A. Specification is 3½d. to 3¾d. per gallon; low gravity, 3d. to 3½d. per gallon; and neutral oil, 3¼d. to 3¾d. per gallon—all *ex* works in bulk.

Cresylic acid is unchanged, there being practically no demand. Pale, 97/99%, is 11d. to 1s. per gallon; dark, 97/99%, 10d. to 11d. per gallon; and pale, 99/100%, 1s. 2d. to 1s. 3d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha.—Supplies are scarce and value is steady at 4½d. to 5d. per gallon f.o.r., according to quantity and quality.

Solvent naphtha.—90/160 grade is 1s. 2d. to 1s. 3d. per gallon, and 90/190 grade 11d. to 1s. per gallon.

Motor benzole is only available in small quantities at 1s. 4d. to 1s. 5d. per gallon *ex* works.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time.

	s. d.		s. d.	
Crude benzole	0 10½	to	0 11	per gallon at works
Motor ,, ...	1 6½	,,	1 7	,, ,, ,,
Pure ,, ...	1 10	,,	1 11	,, ,, ,,

New Capital Issues.

Rugby Gas Company.—As will be seen from our advertisement columns, Messrs. A. & W. Richards, of 37, Walbrook, E.C. 4, are offering for sale by tender, on behalf of the Directors of the Rugby Gas Company, an issue of £10,000 of 4½% perpetual debenture stock at a minimum price of issue of £105 per £100 of stock, yielding at that price £4 5s. 9d.%. Tenders must be received not later than 11 a.m. on Monday, Dec. 19.

Trade Notes.

A Gas Lighting Catalogue.

A recently published catalogue (No. G. 273) of the Wholesale Fittings Company, Ltd., of Commercial Street, London, E. 1, gives illustrations and full particulars of a very wide variety of gas lighting fittings, including mantles, burners, glassware, fancy bowls, bead shades, pendants, brackets, gas rings, stoves, and fires, iron tubes and fittings, small brass fittings, &c.

Contracts Advertised To-Day.

Excavating and Laying and Jointing Mains.

The Torquay and Paignton Gas Company invite tenders for above work. [Advert. on p. 760.]

Overseas Opportunities.

[From the Board of Trade Journal.]

South Africa.

Spun-Iron Main Pipes and Fittings.—H.M. Senior Trade Commissioner in South Africa reports that the South African Railways and Harbours Administration is calling for tenders, to be presented in Johannesburg by Jan. 9, 1933, for the supply of 50,000 ft. of 10-in. diameter spun-iron pipes. (Ref. G.X. 12,091.)

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDER APPLICATION.

Swindon United Gas Company.

To extend the limits of supply of the Company to the Parish of Chiseldon, in the Rural District of Highworth, in the County of Wilts.

Corporation Undertakings' Results.

Ellesmere Port.

The profit on the year's working was £14,223, but this had been swallowed up by the sinking fund charges, and had left them with a loss on the year of £182. Mr. Charles Price, in reviewing the report at a meeting of the Council, said that from time to time there had been various criticisms of the Undertaking. They were told they were not buying their coal in the cheapest market. That was true, but they preferred to buy in the best market.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec 10. (Provincial Exchange Dec. 9.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 3	7⅞	7⅞	Alliance & Dublin Ord. ...	102—112	...	108—110⅜
374,000	"	July 4	4	4	Do. 4 p.c. Deb. ...	80—90	...	...
557,655	"	Aug. 22	7	7	Barnet Ord. 7 p.c.	132—142	...	142
300,000	1	Oct. 17	1/9½	1/4½	Bombay, Ltd.	21/6—23/6	+/6	22/10½—23/7½
177,750	Stk.	Aug. 22	9	9½	Bournemouth sliding scale	195—205	+3	200½—202
550,050	"	"	7	7	Do. 7 p.c. max. ...	145—155	...	151—155
499,160	"	"	6	6	Do. 6 p.c. Pref. ...	135—140	...	...
50,000	"	June 20	3	3	Do. 3 p.c. Deb. ...	75—80	...	...
162,025	"	"	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
210,000	"	"	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
387,900	"	Aug. 22	7½	7½	Brighton, &c. 6 p.c. Con. ...	141—146	+1	...
540,000	"	"	6½	6½	Do. 5 p.c. Con. ...	127—132	...	129—132
195,500	"	"	6	6	Do. 6 p.c. B Pref.	135—145	...	...
1,287,500	"	Aug. 8	5	5	Bristol 5 p.c. max.	108—110[a]	...	...
120,420	"	June 20	4	4	Do. 1st 4 p.c. Deb. ...	96—99[a]	...	...
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	95—98[a]	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	115—120[a]	...	...
855,000	"	Oct. 3	8	7	British Ord.	142—147	+1	145—147
100,000	"	June 20	7	7	Do. 7 p.c. Pref.	140—150	...	...
350,000	"	—	—	—	Do. 5½ p.c. Pref. ...	107—112	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	90—95	...	...
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	105—115	...	...
160,000	"	July 4	5	5	Cambridge 5 p.c. Deb. ...	117—122	...	121
100,000	10	Dec. 5	6	6	Cape Town, Ltd.	7—8*	−½	...
100,000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref. ...	6—7*	...	...
150,000	Stk.	June 20	4½	4½	Do. 4½ p.c. Deb. ...	90—95	...	...
626,860	"	Aug. 8	6	6	Cardiff Con. Ord.	102—107	...	...
237,860	"	July 4	2½	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	"	Aug. 8	6½	5	Chester 5 p.c. Ord. ...	93—98[b]	...	...
98,936	1	Oct. 17	2/-	2/-	Colombo, Ltd. Ord.... ...	25/—30/-	...	...
609,204	1	Oct. 17	/10 90	/11 47	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	17/6
296,058	1	"	1/2 54	1/3 30	Do. 8 p.c. Pref.	19/—21/-	...	...
1,822,505	Stk.	Aug. 8	5½	5	Commercial Ord.	104—109	...	105½
475,000	"	June 20	3	3	Do. 3 p.c. Deb. ...	74—79	...	...
240,744	"	—	—	—	Do. 5 p.c. Deb. ...	119—124	...	120—122
807,560	"	Aug. 8	7	7	Croydon sliding scale ...	139—144	+1	141½—143
469,590	"	"	5	5	Do. max. div.	95—100	...	...
500,000	"	July 4	5	5	Do. 5 p.c. Deb.	120—125	...	...
542,270	"	Aug. 8	10	7	Derby Con.	150—160	...	...
55,000	"	July 4	4	4	Do. 4 p.c. Deb.	75—85[c]	...	...
209,000	"	Sept. 5	5	5	East Hull Ord. 5 p.c. ...	97—102	...	...
179,500	"	Aug. 22	5½	6	East Surrey Ord. 5 p.c. ...	108—118	...	...
155,019	"	June 20	5	5	Do. 5 p.c. Deb. ...	118—123	...	...
1,002,180	"	Sept. 19	16½	15	European, Ltd.	122—127	...	122½—127
19,405,992	"	Aug. 8	5½	5½	Gas Light & Coke 4 p.c. Ord.	24/—26/-[f]	+1/-	23/9—25/-
2,600,000	"	"	3½	3½	Do. 3½ p.c. max.	80—85	...	81½—83
4,477,106	"	"	4	4	Do. 4 p.c. Con. Pref. ...	98—101	−1	98—101
6,102,497	"	June 20	3	3	Do. 3 p.c. Con. Deb. ...	79—83	...	78—80½
8,642,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	111—116	...	115—116
3,500,000	"	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	108—112	...	110½—110½
264,011	"	Aug. 22	—	6	Harrogate New Cons. ...	110—115	...	...
82,500	"	Aug. 22	7	7	Hastings & St. L. 5 p.c. Conv.	130—140	...	105
258,740	"	"	5½	5½	Do. 3½ p.c. Conv.	102—107	...	...
70,000	10	Oct. 17	110	110	Hongkong & China, Ltd. ...	94—10½	...	...
213,200	Stk.	Aug. 22	6	6	Hornsey Con. 3½ p.c. ...	117—122	...	199—204
5,600,000	"	Nov. 21	14	10	Imperial Continental Cap.	198—208	+3	91½—92½
228,130	"	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb.	90—95	...	158½—159½
285,242	"	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	152—162	...	...
9,145,907	"	Aug. 22	6	6	Liverpool 5 p.c. Ord. ...	118½—120¾[b]	+¼	...
245,500	"	June 20	5	5	Do. 5 p.c. Red. Pref. ...	100—110[b]	...	...
306,083	"	July 15	4	4	Do. 4 p.c. Deb. ...	100—102	...	...
165,736	"	Sept. 5	10	8	Maidstone 5 p.c. Cap. ...	160—170	...	...
56,176	"	June 20	3	3	Do. 3 p.c. Deb. ...	69—74	...	...
75,000	5	Dec. 5	110	110	Malta & Mediterranean ...	7½—8½*	−¼	...
892,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	97—102	...	...
171,978	Stk.	Sept. 5	5	5	M. S. Utility "C." Cons. ..	100—110	...	...
718,657	"	"	4	4	Do. 4 p.c. Cons. Pref.	90—95	...	...
112,126	"	July 4	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
148,955	"	"	5	5	Do. 5 p.c. Deb ...	115—120	...	...
675,000	"	21 May '31	16	16	Montevideo, Ltd.	35—45	...	...
2,061,315	"	Aug. 8	5½	5	Newcastle & Gateshead Con.	22/6—23/6[d]	+/3	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	91—93[d]	...	...
691,705	"	June 20	3½	3½	Do. 3½ p.c. Deb. ...	89—91[d]	...	...
377,285	"	Nov. 7	5	5	Do. 5 p.c. Deb. '43...	103—107[d]	...	...
275,000	"	Aug. 8	5	5	Newport (Mon.) 5 p.c. max.	93—95[a]	...	...
199,910	"	Aug. 22	7½	7½	North Middlesex 6 p.c. Con.	135—145	...	142—143
996,160	"	Aug. 8	5	5	Northampton 5 p.c. max. ...	96—101	...	...
300,000	"	Dec. 5	7	9	Oriental, Ltd.	105—110*	−1	...
205,162	"	June 20	8	8	Plym'th & Stonehouse 5 p.c.	145—153	...	149
504,416	"	Aug. 22	8	8	Portsm'th Con. Stk. 4 p.c. Std.	150—160	...	...
241,446	"	"	5	5	Do. 5 p.c. max. ...	97—102	...	...
114,000	"	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...	...
686,312	"	July 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	77—82	...	...
389,813	"	June 20	4	4	Do. 4 p.c. Cons. Deb.	77—82	...	...
150,000	10	Sept. 19	6	6	San Paulo 6 p.c. Pref. ...	6⅞—7¼	...	...
1,736,968	Stk.	Sept. 5	6	6	Sheffield Cons.	110—114[e]	...	...
95,000	"	July 18	4	4	Do. 4 p.c. Deb.	92—96[e]	...	...
135,201	"	Sept. 5	5	8½	Shrewsbury 5 p.c. Ord. ...	118—123	+5	...
90,000	10	June 6	15	15	South African	4—6	...	...
6,709,895	Stk.	Aug. 8	7	5	South Met. Ord.	120—125	...	121—123
1,185,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	138—143	...	139½—141½
1,885,445	"	July 4	3	3	Do. 3 p.c. Deb. ...	79—82	−1	79¼
1,000,000	"	July 18	4	5	Do. 5 p.c. Red. Deb.	109—114	...	112—113
91,500	"	Aug. 8	8½	8½	South Shields Con.	140—145[d]	...	...
1,543,795	"	Aug. 8	6	6	South Suburban Ord. 5 p.c.	118—123	...	121
800,000	"	"	5	5	Do. 5 p.c. Pref.	113—118	...	116
668,827	"	June 20	5	5	Do. 5 p.c. Deb.	120—125	...	122—122½
647,740	"	Aug. 22	5	5	Southampt'n Ord. 5 p.c. max.	101—106	...	...
121,275	"	June 20	4	4	Do. 4 p.c. Deb.	95—100	...	...
350,000	"	Aug. 8	—	9/-	Swansea 5½ p.c. Red. Pref.	110—114	...	110
200,000	"	June 20	6½	6½	Do. 6½ p.c. Red. Deb.	105—110	...	...
1,076,490	"	Aug. 8	6½	6½	Tottenham and District Ord.	131—136	...	133
300,000	"	"	5½	5½	Do. 5½ p.c. Pref. ...	120—125	...	...
199,005	"	June 20	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
88,701	"	Sept. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	67—72	...	...
346,069	"	Aug. 22	7	7	Uxbridge, &c., 5 p.ct. ...	130—140	...	137—139
88,330	"	"	5	5	Do. 5 p.c. Pref. ...	112—117	...	...
1,322,220	"	July 4	7	7	Wandsworth Consolidated	136—141	...	139½—141
1,096,373	"	"	5	5	Do. 5 p.c. Pref.	115—120	...	115—117
1,317,964	"	June 20	5	5	Do. 5 p.c. Deb.	118—123	−2	118—120
158,400	"	Aug. 22	6g	5	Winchester W.&G.5p.c.Con.	100—105	...	...

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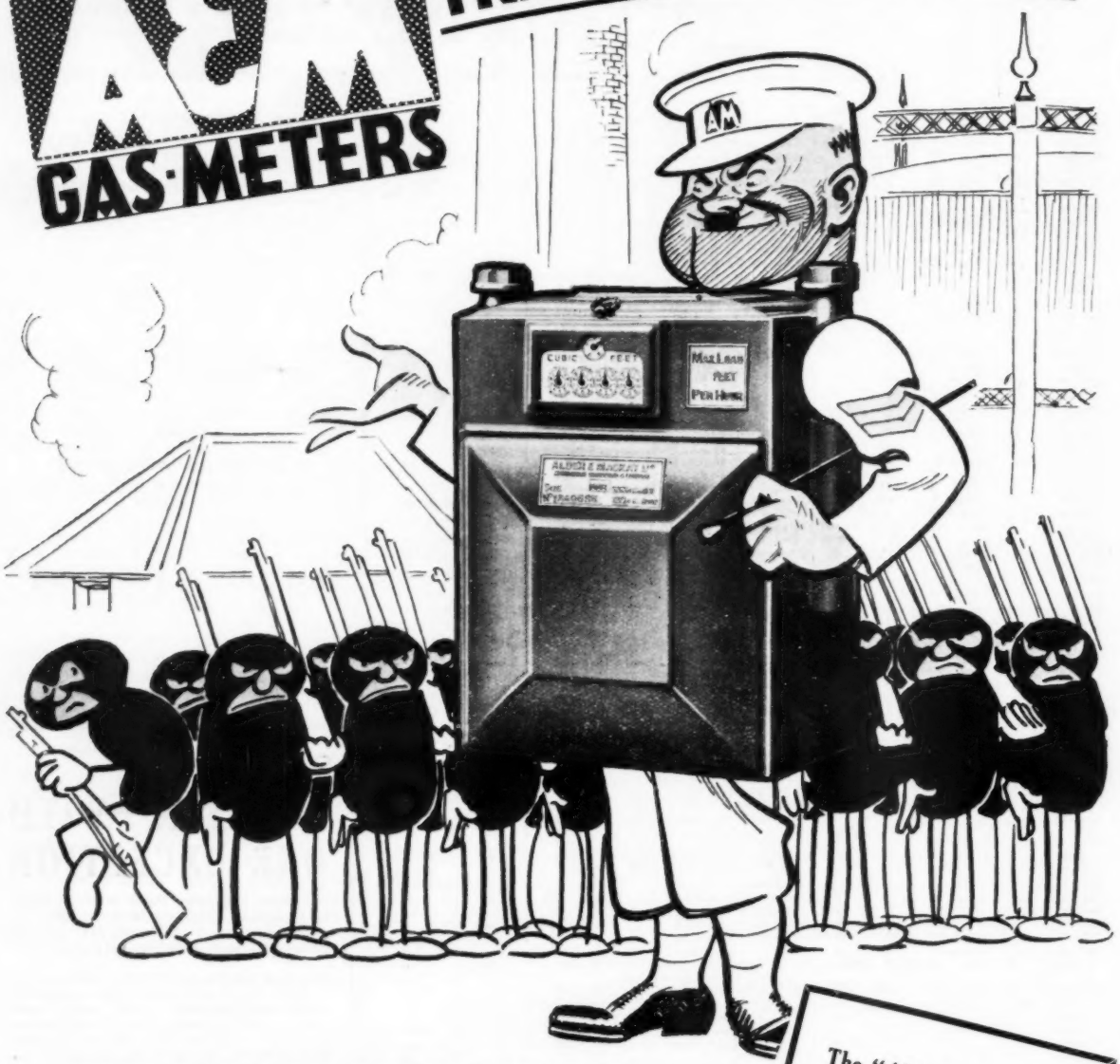

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